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PRIZE ESSAY.

THE MERCHANT MARINE AND THE NAVY.

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"Similia Similibus Curantur."[1]

Our merchant shipping is a subject which is pushing more and more to the front, and it is undoubtedly the most deserving and the most sadly neglected of all our national interests. The story of Cinderella is nothing in comparison with it, but like the forsaken child of fairyland, it is destined some time or other to come into its own. For many years a persistent few have been bending their efforts towards the resuscitation of our ocean shipping, and in the last decade such a momentum of public opinion has been accumulated in its favor that the day can be easily foreseen when the American flag will again take its old place upon the high seas. But this will not be until our people are educated to understand the importance of the question, as well as the influences that control it.

In approaching this subject it is difficult to refrain from mentioning the recent attacks made upon the navy by a publication of good standing which has adopted for its motto, "No Merchant Marine, No Navy." This publication justifies itself upon the sup-

[1] "Like things are cured by like."

position that the upbuilding of the merchant marine is in some way dependent upon the Navy Department, and that the latter has in some way failed to upbuild the merchant marine. Being in a position to consider such a proposition only in its broadest sense, such propaganda must necessarily be classified as rubbish, as no one who knows anything at all about the conditions of our merchant shipping would seriously entertain such an idea for a moment. We can easily remember the circumstances surrounding the recent order of the Chief Executive which sent our fleet around the world without previous notice or without other than current appropriations; and we can easily conceive that the immediate problem of supplying that fleet with coal could not have been made secondary to the main purpose of utilizing the circumstance as a means of building up the merchant marine, however ineffective such a measure would have been. The merchant marine is beyond the control of the executive branch of our government, the legislative branch has slumbered upon it for a half century, while the actual control lies in the hands of the foreign shipping interests that are stifling it to death; influences that would be only too glad to pull down our navy as they have done our merchant marine. The upbuilding of the navy is due to patriotic sentiments on the part of many of our statesmen who are totally opposed to the merchant marine, and to turn their sentiments against the navy can in no wise benefit the merchant marine; but, on the other hand, the foreign control of our merchant shipping would naturally lie closely in association with those opposed to the policy of upbuilding the navy. It would then be well to examine very closely into the motives and interests of those engaged in such an attack through such a pretext.

OLD FRIENDS.

The navy is a friend of the merchant marine, even though it is long since they have met in home waters or upon the high seas. The report of Senator Gallinger for the Committee on Commerce, December 15, 1905, said: "Nobody who wants the merchant marine built up would have the navy cut down. The great men of the navy are powerful champions of the merchant marine. Every strong friend of the merchant marine is a strong friend of the navy also. The foe of one is apt to be the foe of both." Sea power consists of a navy and a merchant marine, but not of one

without the other. The old British axiom, "Trade follows the flag," is the index of national greatness. The navy is an insurance upon the trade it protects, and it is supposed to be that element of sea power which furnishes the pressure necessary to push the flag over all the seas during peace or during war, to permit the uninterrupted control of trade. Trade means wealth, which means power; and it is that sea power which controls the world and which makes history. This is the theme which is to be found threaded throughout the story of sea power as expounded by Mahan in his "Influences of Sea Power upon History." The truth of that gospel is generally recognized as beyond question. All history proves it, and the present is no exception to the past. In the past Great Britain has been pursuing the regular business of dominating upon the seas, and incidentally has controlled our over-sea commerce and has grown rich and fat upon it. She has constantly followed the creed of Sir Walter Raleigh, who said: "The nation that controls the seas of the world, controls the trade of the world, and the nation that controls the trade of the world controls the riches of the world, and consequently the world itself."

The following quotations are from Mahan's "Sea Power":

"Notwithstanding all the familiar and unfamiliar dangers of the sea, both travel and traffic by water have always been easier and cheaper than by land. . . . . The ships that thus sail to-and-fro must have secure ports to which to return, and must, as far as possible, be followed by the protection of their country throughout the voyage. This protection in time of war must be extended by armed shipping. The necessity of a navy, in the restricted sense of the word, springs, therefore, from the existence of a peaceful shipping, and disappears with it except in the case of a nation which has aggressive tendencies, and keeps up a navy merely as a branch of the military establishment."

For three hundred years the foremost policy of Great Britain has been to dominate the seas. Mahan gives an insight into the workings of this policy over two hundred years ago and subsequently, thus: "But not one of these gains, nor all together, compare in greatness and much less in solidity, with the gain to England of that unequaled sea power which started ahead during the war of the league of Augsburg (1688-1697) and received its completeness and seal during that of the Spanish Succession (1702-

1712). By it she controlled the great commerce of the open sea with a military shipping that had no rival, and in the exhausted condition of the other nations could have done; and that shipping was now securely based on strong positions in all the disputed quarters of the world. Although her Indian Empire was not yet begun, the vast superiority of her navy would enable her to control the communications of other nations with those rich and distant regions, and to assert her will in any disputes arising among the trading-stations of the different nationalities.

"The sea power of England, therefore, was not merely in the great navy, with which we too commonly and exclusively associate it; France had had such a navy in 1688, and it shrivelled away like a leaf in the fire. Neither was it in a prosperous commerce alone; a few years after the date at which we have arrived, the commerce of France took on fair proportions, but the first blast of war swept it off the seas as the navy of Cromwell had once swept that of Holland. It was in the union of the two, carefully fostered, that England made the gain of sea power over and beyond all other States; and this gain is distinctly associated with and dates from the war of the Spanish Succession. Before that war, England was one of the sea powers; after it she was *the* sea power, without a second.

"Is it meant, it may be asked, to attribute to sea power alone the greatness and wealth of any State? Certainly not. The due use and control of the sea is but one link in the chain of exchange by which wealth accumulates; but it is the central link, which lays under contribution other nations for the benefit of the one holding it, and which, history seems to assert, most surely of all gathers to itself riches."

After describing the desolation and ruin of France two years after the peace, he says further: "Thus it was in France, with a population of nineteen millions at that time to the eight millions of all the British Islands; with a land vastly more fertile and productive; before the great days, too, of coal and iron. In England, on the contrary, the immense grants of Parliament in 1710 struck the French prodigiously; for while their credit was low, or in a manner quite gone, ours was at its zenith. 'During the same war there appeared a mighty spirit among our merchants which enabled them to carry on all their schemes with a vigor that kept a constant circulation of money throughout the kingdom, and af-

forded such mighty encouragement to all manufactures as has made the remembrance of those times grateful in worse.' "

Still another view is given some fifty years later, just before the American Revolution, in the following quotation: "The English naval historian, speaking of the same period (1756-1760), says: 'While the commerce of France was nearly destroyed, the trading fleet of England covered the seas. Every year her commerce was increasing; the money which the war carried out was returned by the produce of her industry. Eight thousand merchant vessels were employed by the English merchants.' And again, summing up the results of the war, after stating the immense amount of specie brought into the kingdom by foreign conquest, he says: 'The trade of England increased gradually every year, and such a scene of national prosperity, while waging a long, bloody, and costly war, was never before shown by any people in the world.' "

The above gives us an insight into the control of the sea trade prior to the American Revolution which Great Britain has since maintained. Later I shall take it up from that point and trace its main features as occurring in our own shipping down to the present day.

In this day and age new world problems have arisen, our Monroe doctrine is an advanced guard upon the trade of the future, so likewise are the Philippines and the Panama Canal. Our navy has been essential to the acquiring and the maintaining of these assets; it has been created out of pure patriotic idealism, aside from commercial considerations.

In other days, the sailing ships-of-the-line formed the fighting force independently of merchant auxiliaries, and the merchant fleet was not an essential part of the fighting force. To-day, however, the steam navy requires colliers, scouts, repair ships, supply ships, and hospital ships, and all of these are of such nature that they can be converted at once from the merchant shipping in an emergency. A nation, therefore, which has no merchant shipping, as this country, has only an incomplete navy in the matter of *material*. So, likewise, the personnel; as Admiral Sampson said of his own fleet that went to Santiago, "that if the advance force under him should have met with disaster, there was absolutely no reserve force to fall back upon." All the personnel of the navy in the enlisted force was upon the first line of attack and none were left behind. A merchant fleet, therefore, possesses these ele-

ments of sea power: (1) The capacity to carry trade in peace and war; (2) the elements suitable for immediate conversion into naval auxiliaries upon the outbreak of war; and (3) the reserve personnel to fall back on in case of disaster to the first line of battle. In order for the government to be in position to utilize the merchant fleet to accomplish either of the above-mentioned functions, it is necessary that the government should supply the wherewithal necessary to set the merchant marine up in business, and put it on its feet upon a paying basis so that it can continue in operation, and perform its two-fold function of (1) supplying the nation with a means of controlling the wealth of the country through trade, and (2) supplementing the navy with the elements of force necessary for battle; so that, taken all three together, the navy, the merchant naval auxiliaries, and the merchant marine proper, may unite to form the unit of sea power now necessary to place this country upon a respectable footing as a great and independent nation. It is a national proposition pure and simple. No merchant marine exists *per se*, or can exist in this day and time. It requires governmental creation and support through a capitalization supplied by the government in the shape of money and favorable laws. All nations do it alike that have a merchant marine. The method of capitalization universally applied is called "subsidizing." Subsidizing is a word which has been made frightfully unpopular in this country, and ever since one can remember most of the politicians have had chills to run all up and down their spinal columns at the mention of the words "ship subsidy." The reason of this is because the foreign interests that have been flourishing upon the wealth extracted from the control of our ocean shipping, have taken the pains to educate the people of this country to detest the words "ship subsidy."

SUBSIDY.

In general terms, *subsidy* may be called *capitalization. Ship subsidy* is the highest form of capitalization that a nation can have. It was discovered by England, and the practice of it led to the control of the shipping trade of all the seas, out of which has grown the greatest world power of history. The returns have warranted the expenditures. England's success was not due to a lack of competition; she has always had rivals in the sea trade. The shipping business left to its own resources must necessarily meet all

competitors upon equal terms upon the neutral grounds of the high seas, and if left upon equal terms must share the successes and failures of the others. England took no such chances. In order to possess and hold a positive and certain control of the one profession upon which her national greatness depended she created shipping subsidies, which, though *artificial,* were positive in effect. The advantage thus gained cannot be offset by her rivals except through like subsidies. Those nations that have been able to build up and maintain a permanent merchant shipping have found it necessary to subsidize. Subsidy is the *sine qua non* of a merchant marine. This great and ungainly country, lethargic through the gains of internal development, careless through ignorance of her own condition, vulnerable through her political subdivisions, and misguided by the false preachments of individuals and newspapers paid by the foreign shipping interests, is so blinded that she cannot see that *ship subsidy* is the first essential toward the creation of a merchant marine. To-day both political parties of the country are more or less in favor of creating a merchant marine, but the foreign interests have accompanied our shipping campaigns with offers of quack cures, and we are troubled with all sorts of hallucinations about "free trade," "free ships," "discriminating duties," "tonnage taxes," all of which are variously urged by those who wish our shipping to come to grief, and those who have been misled by these; and where the suckers fail to take these baits, they have on the one hand raised the cry that subsidies are unconstitutional, and on the other hand they have pointed out that, if subsidies are voted, somebody would get the money; and if the individuals thus mentioned already had any money, that was sufficient reason why there should be no subsidies. These heresies are engineered by the foreign shipping interests through their steamship agents in our shipping ports. These agents form a leading factor in the membership of our chambers of commerce, cotton exchanges, maritime exchanges, and sometimes of other commercial and political bodies; and in many instances they dominate these bodies. In all instances they control the shipping rates and conditions, and they utilize their advantages to freeze out competitors by all the methods known to our local politics.

They are said to maintain a lobby at Washington and press bureaus at Washington and New York; they control leading news-

papers in our leading seaports and influence others through advertisements, and carry on newspaper campaigns against merchant marine legislation. The funds necessary to do this are furnished from the profits they reap in carrying our over-seas trade. They have played our State and city politics to obtain special advantages, through our national weakness of states-rights, with the varying and differing port laws and regulations, all to the exclusion of our own unprotected merchant shipping. In brief, they have broken our bundle of sticks, not in one united bundle, but each stick separately of our scattered, disunited, unkempt maritime policy. Being a country made up of foreigners, more or less recent, with or without a foreign accent, it is our habit to regard all residents in the light of Americans and without the suspicions inherent in European countries. If, therefore, foreign steamship companies have planted foreign agencies and employees, little foreign colonies, on American soil, their facilities for taking part in our commercial and political life, and our own vulnerability to their blandishments, have been correspondingly increased; and our habitual lack of suspicion has been one of the leading causes of our undoing.

To illustrate, let us compare the shipping business to the dairy business. If we were going into the dairy business to compete with other companies for the production and sale of milk and butter, we find that all the competing firms feed their cows upon hay, and their business is thriving. Our own cows we have turned out to graze upon barren and uncertain fields and we have given them no feed. Our business shrinks, our cows die, until we have only a small percentage left. We have got to do something better, or get out of business and buy our milk and butter from our rivals. We stubbornly refuse to feed our cows on hay. We rise up and proclaim that they shall thrive on thistles or go without feed, and we'll be confounded if we feed them on hay, although we have hay to burn all over the enclosed fields and all round about the barn. If our rivals feed on hay, that's the reason why we won't, even though we never knew of a dairy to maintain a permanent business that didn't feed on hay. And our rivals get their hay from us in exchange for the milk and butter we buy from them —but why go further in the analogy between hay and subsidy! And yet we think we are a business nation!

HISTORICAL.

From the foundation of this republic up to 1815, and in part to 1828, and even 1849, the historic policy of the fathers of the republic was in vogue, namely, discriminating duties. In those days we had not entered into the forty reciprocity commercial treaties with other nations which now forbid us to practice upon other countries the discriminating custom duties and discriminating tonnage dues, and vice versa. No nation now practices discriminating duties, though several have tried it but gave it up on account of retaliations. Under our discriminating duty system our ocean tonnage began in 1789 at 124,000 tons, and increased to 855,000 tons in 1815. Here, at the end of the war of 1812, we received a setback, due to our signing one of the above-mentioned treaties as the price of peace with Great Britain, in which "our government gave way and signed an agreement with England for the mutual suspension of discriminating duties in the direct commerce of the two countries" and that "despite the fact that we had defeated the English in eleven out of thirteen engagements on the sea."[1] Thereafter our foreign shipping declined by 25 per cent, and it required a quarter of a century to bring the tonnage up to the point before the war of 1812. In the meantime, in 1828, "since England had broken down our discriminating duty system by compelling that an exception be made in her case, the government decided that it was not fair to practice discriminations against other nations, Congress repealed the 10 per cent differential duty."

It will thus be seen, now, that a return to the obsolete discriminatory system as a means of resuscitating the merchant marine is wholly out of the question. A single move in that direction would bring retaliation from the nation affected, and place us without the pale of present-day commercial practice. There are certain spokesmen, parading up and down as American patriots, now vociferously advocating a return to discriminating duties, either willingly or unwittingly subservient to the foreign shipping interests in the desire to steer our present merchant marine campaign to its destruction upon the breakers.

In 1835 England first subsidized the line across the Atlantic to New York, which line was supplied with the new iron steamships

[1] "Shipping Restoration. The Causes of Decline Examined; Justice of the Demand for Legislation." By W. W. Bates, N. A.

put in competition with our celebrated clipper ships of that period, with the result that our shipping soon found that it could not compete upon equal terms with the early Cunarders. This country, in 1845, sought to equalize conditions by passing the first mail subsidy law, signed by President Tyler, a Democratic President. Under this law the Collins Line came into existence in 1849, and within two years the monopolistic freight rates of the Cunarders were reduced by nearly one-half. Our ocean shipping jumped forward with a bound, and lines were established belting the world. We were at once competing closely with the Cunarders, and the shipping policies were continued under President Polk, another Democratic President, and a Democratic Congress. While the support of our maritime policy at the period was non-partisan, yet the Democrats appear to have taken the leadership in its advocacy, and a number of speeches made by the leading Southern statesmen at that epoch have been unearthed, sufficient to show that the spirit was prevalent North and South to vote subsidies for the Collins Line to excel the Cunard Line. In 1855 our over-sea shipping had reached its zenith, when the rumblings of the Civil War cast their shadows ahead, and the national policy was being swallowed up in the fierce partisanship of the coming strife. A reversal of sentiment was begun under President Pierce, whose Secretary of War was Jefferson Davis, and had no doubt in view the coming conflict; for opposition broke out from the South and at that time it was well known that Great Britain was encouraging the Southern leaders, as she aided the Confederacy afterwards, in breaking up the merchant shipping of the country.

So, when the bill was passed in 1855 by both houses of Congress, after a bitter fight, extending the contract with the Collins Line, it was vetoed by President Pierce, and three years later the Collins Line went to the wall, after a heroic struggle and many disasters. Its finest vessel, the *Adriatic*, that had just made her first run, was sold to one of the British lines, and the British flag replaced the stars and stripes upon her mast. Our ocean shipping had received its death blow. In 1861 we had about 2,500,000 tons; in 1865, only about 1,500,000 tons remained. At the beginning of the war we carried about 62 per cent of our imports and exports; in 1865, only about 28 per cent. The Confederate cruisers furnished by England destroyed 110,000 tons of American shipping and forced a great number of other vessels to adopt

foreign flags, and were directly and indirectly responsible for the loss to this country of over 1,000,000 tons of American shipping, valued at more than $150,000,000.00. Rather than lose Canada, which we threatened to take, England paid us $15,500,000.00 as the amount of the award of the Alabama Claims, a rather cheap cost with which to encompass the complete destruction of her chief rival upon the seas. Since then our ocean shipping has continued to dwindle, until now we carry only 6 per cent of our imports and exports, and year by year additional lines have been forced to go out of business. In 1886, the International Navigation Co. of Philadelphia, which owned three steamers operating under the Belgian flag between Philadelphia and Antwerp, and receiving a subsidy of over $100,000.00 a year from the Belgian government, bought the Inman Line of British mail steamers; thereupon the British government promptly cancelled its contract with the Inman Company, and the Americans were given to understand that the British government would not give mail pay to a company owned entirely by American capital. At the same time, the White Star, the Cunard, and the German companies were being paid several hundred thousand dollars a year for carrying the mails of this country. The *City of New York* and the *City of Paris*, the two finest ships of their day, were then nearly completed on the Clyde, and the new owners of the Inman Company, not being able to operate them without the aid of subsidy, found themselves in a serious predicament. They appealed to our Congress to be permitted to sail under American registry, and be granted a mail subsidy; and Congress came to the rescue by the Act of 1891, the company agreeing to build in this country two additional vessels, the *St. Louis* and the *St. Paul*, which were accordingly built at Cramps' Shipyard, Philadelphia, in 1894-1895. Mrs. Grover Cleveland christened the *St. Louis* in 1894. These vessels now form the American Line in transatlantic traffic. For the year 1905, the American Line of five ships received about $663,000.00 of the U. S. Mail Subsidies, while $548,000.00 of our subsidies went to the North-German Lloyd, Hamburg-American, Cunard, and White Star lines. During the Spanish-American War, the *St. Paul* and the *St. Louis* became available as auxiliary scout cruisers and did good service in the navy, whereas the *Columbia* and *Normania* of the Hamburg-American, and the *Havil* of the North-German Lloyd, were sold by these companies to the Spanish

government after the war broke out, and were employed to operate against us—vessels produced out of the profits of United States trade and United States subsidies. One or two of these vessels were employed in the fleet under Admiral Camara, which sailed from Cadiz to intercept Admiral Dewey, but returned when the American fleet was organized to strike the Spanish seaboard.

If we wrote a comprehensive history of our modern merchant shipping, it would be mostly occupied with foreign ships, since we have employed and depended upon them to do our carrying and have subsidized them liberally with our abundant wealth. We are now spending $400,000,000.00 building the Panama Canal for the use of foreign ships, one clause of the Hay-Paunceforte treaty being as follows: "The canal shall be free and open to the vessels of commerce and of war of all nations observing these rules, on terms of entire equality, so that there shall be no discrimination against any such nation, or its citizens or subjects, in respect of the conditions or charges of traffic or otherwise. Such conditions and charges of traffic shall be just and equitable." We have spent fully as many more millions dredging the Ambrose channel into New York harbor, the channel into Boston, the Delaware river most of its length, the channels leading into Galveston, Savannah, and Charleston, and dredging and jettying the Mississippi river leading into New Orleans; all of which has, in effect, been contributory to the subsidizing, with our wealth, the navies and merchant marines of these foreign nations. The government locks at the Sault St. Marie, and the improvements to waterways in the Great Lakes, are likewise enjoyed by Canadian shipping. We have built and maintained a magnificent and complete system of lighthouses and coastlights touching each other throughout the entire span of our territory and dependencies, and a complete system of buoys rendering every river and harbor safe for navigation. We have likewise built and maintained innumerable life-saving stations, all comprising the most complete and up-to-date aids to navigation possessed by any country in the world. All of this has been generously paid for out of our treasury without any adequate returns from the foreign shipping which has so greatly profited thereby.

To control is to fix and to determine; to be controlled is to be dependent upon, and await the pleasure of. Foreign steamship companies determine our shipping freight rates; they determine

the ports through which shipments are made, thereby building up one port to the detriment of another; and in case a foreign war breaks out, these ships are subject to be withdrawn and employed in the war, in which case our goods would lie upon the wharves awaiting the further disposition of the remaining foreign shipping of countries not engaged in the war. At the outbreak of the Boer war in 1899, Great Britain withdrew 250 steamships, of about 1,000,000 tons, from commerce, and converted them into use for transport and supply service. The ships of the North Atlantic being, as a rule, large and swift and most suitable for this service, were drawn upon for the most part, and the export trade of this country was the hardest hit. It was then we had a rude lesson of our dependence upon foreign ships. When the best ships had thus been withdrawn to undertake profitable government charters, some were replaced by a few old, cheap, and inefficient craft, with which to carry our goods. In the port of Boston alone the number of sailings in 1900 with grain, flour, provisions, and cotton, was 46, or 13 less than the year before, and some of these were in inferior vessels of smaller tonnage. According to the Boston Chamber of Commerce, the tonnage cleared at that port in the first four months after the outbreak of the war was 215,960 tons. The Boston Commercial Bulletin stated that in the year, the export in corn had been reduced from 2,107,694 bushels to 302,924 bushels, the actual decrease in cereals having been 1,750,000 bushels. The American shipments elsewhere were demoralized. The cattle shipments were reduced by about 4,000,000 head out of about 30,000,000, England being our chief customer. Our export breadstuffs, going all over the world, and carried mostly by British ships, shrank from $318,000,000.00 in 1898 to $270,000,000.00 in 1899 and $251,000,000.00 in 1900, in round figures. The freight rates, however, were increased by 30 per cent and the British shipowners lost nothing on the deal; but our farmers and merchants thereby contributed many millions of dollars to the subjugation of the Boer republic. And yet our farmers, and their representatives, in the West are opposed to ship subsidy, while they are said to have contributed enough in the Boer war to subsidize our own foreign shipping for twenty years! The total of our losses in that war cannot be fully estimated, but the effects were felt throughout the entire country, and that was in a war directed against a small country possessing not a single privateer or cruiser. What then

if two large countries like Germany and England should go to war? We would be left high and dry upon the beach, without shipping to carry our commerce.

I have introduced the above facts into the final remarks under the paragraph devoted to the history of our merchant marine, since it appears fitting to have followed its transmigration from under the stars and stripes to the flags of other countries where it now is, and where we must leave it for the present.

PRESENT CONDITIONS.

Our foreign going merchant marine consists of ten (10) vessels, four of the American Line; one of the Great Northern Steamship Co., the *Minnesota,* plying between Seattle and the Orient; and five of the Pacific Mail Steamship Co., between San Francisco, Hawaii, Japan, China, and Hongkong. The last-mentioned company are expecting to withdraw the *Korea,* and later the rest of this line, and only a subsidy at this Congress can prevent this result. The same is true of the *Minnesota.* Only the American Line has any prospects of permanency due to the subsidies under the Ocean Mail law of 1891, passed during the administration of President Harrison. The Pacific Mail and Great Northern Companies are operated by the Harriman and James J. Hill Railroad interests as an adjunct to those lines, because of their value in making through freight rates to the Orient. The routing over all other railroads in this country of export goods is determined in great measure by the foreign steamship companies through their local agents. The railroads are placed into competition with each other, with the result that these agents are able to control the roads themselves sufficiently to kill all competition, and the roads thus favored with the handling of this freight are forced to comply or lose the traffic. This method of controlling the rates, and the roads themselves, in such a way as to freeze out the competition of independent home steamship lines, is exactly the same as practiced by the Standard Oil Co. prior to the establishment of the Interstate Commerce Commission; unfortunately this commission has no jurisdiction over through ocean shipping.

An agent of one of our railroads at New Orleans thus describes the method of operations: "The use of private terminal wharfage by favored steamship interests where their terminal expense is reduced to a minimum by railway absorption of charges, as quoted

in their tariff, while these terminals are denied to the independent lines, has eliminated the American tramp ship and forced out of the trans-oceanic trade all ships of American register. These terminals are owned and operated by the railways, viz: Stuyvesant Docks, Westwego, Chalmette, Southport, Gretna Wharf, and Algiers Wharf." In fact, all the shipping terminals. The description further details the facilities afforded the favored lines and the obstacles placed in the way at the public wharves. Thus, the railroad keeps special handlers for the freight of the favored line, and the wharf is on the same level as the car doors, allowing a level truck from car to point of assemblage cargo; a switch engine in attendance prevents delays. The charges are very light, barely covering the labor used. When the order is given to unload a car, the failure to do it on that day places the demurrage charges *upon the railway*. The public wharves of these terminals are so arranged that the car door is 3 feet above the wharf, making the expense of handling double or treble that of the favored line, and demurrage begins after a stated time as provided for the general public under the regular railroad tariffs. Also, in the case of car shortage which is the usual thing, the cars containing goods for the public wharves must be unloaded upon open wharves, and tarpaulins rented at 25 cents each a day, 5 tarpaulins per car, and 5 watchmen per car at $2.00 per day each. Thus in the case of a ship of 4000 tons, or 200 cars of 20 tons each, the demurrage, after the free time allowed, would be $200.00 a day. The charges for tarpaulins, watchmen, and handling $71.33 a day; or a total of $271.33 a day or fraction thereof. The average ships take five days to load its total capacity if all were available, making a minimum of $1356.65 charges which the favored ship does not have to pay. It is manifest that the latter thus prevents its rival's prosperity and makes a good margin on its own cargo. The ability of the favored foreign steamship line to prevent competition is augmented by the fact that, in return for the privilege of handling the through freight of this steamship company, the latter are accorded the services of the regular soliciting freight force of the railway, who assemble cargo for these lines in hauling tonnage for their own lines. "The ruling of the Interstate Commerce Commission on making the initial line responsible for the delivery at destination is sufficient authority to allow such discrimination, and permit the making of through provisional bills of lading over these

lines, while denied to independent vessels." This is the key to the whole situation, but many people who have observed the workings of these steamship lines in conjunction with the railroads have erroneously attributed the fault to the railroads. We are now in a position to understand why the late Mr. Harriman continued the operation of the Pacific Steamship Co. at a loss of $500,000.00 a year; it was undoubtedly to prevent the foreign steamship lines from taking over the profits of his railroad lines on through shipments. So likewise with Mr. James J. Hill's *Minnesota*.

Reverting to the port of New Orleans, which has been an easy prey of foreign steamship companies, an insight into the methods by which the profits have been squeezed out of that purely shipping city, is illustrated by a controversy occurring in the Board of Trade between the Cotton Exchange and the Maritime Exchange, the lamb and the wolf, respectively. The account appears in the *Times-Democrat* of November 18, 1906, and was reiterated in the issue of December 19, 1909. This controversy brought out the fact that the Maritime Exchange is composed of the foreign agents of foreign steamship lines, who were accused by the Cotton Exchange of throttling the commerce of the city, and of squeezing all the profit out of the cotton business. The method was through fixing the freight rates based upon the density with which the cotton was packed. The Cotton Exchange, made up partly of foreign steamship agents, but mostly of American citizens, made this pathetic appeal to the Board of Trade:

"The Maritime Exchange is a foreign corporation, formed by the foreign shipping interests, because its members formerly in the Cotton Exchange were not allowed to pass laws injurious to the trade of the port. No one objected to them protecting themselves, providing the requirements were the same as in other ports, but they first established rules detrimental to the port, and to avoid being brought into court and exposed, placed the following clauses in their contract," etc. Then after a pathetic plea asking the Board of Trade to force the Maritime Exchange to give New Orleans the same rules and rates as the other ports, ended by saying: "Let the steamers that do not conform to these rules go elsewhere. Other lines will take their places." This protest was duly rejected, with force, by the Maritime Exchange, over the signatures of the agents of the foreign steamship companies, who accompanied the reaffirmation of the unfair charges by a threat of fur-

ther discrimination, and this was duly approved by the president of the Board of Trade. At the same moment the British agent of the Leyland Line, whose signature appeared among the others of the Maritime Exchange, was president of the New Orleans Progressive Union, the most wide awake and influential commercial and political body in the South, and the influence of this body was in a position to be swayed against our merchant marine. The sentiment of New Orleans gives the cue to the other cities of the Mississippi Valley and greatly influences the entire South. Galveston, built up by these shipping interests, is full of foreign influence, and two papers of that city are violently opposed to American shipping. But New Orleans is awakening, a branch of the Merchant Marine League has just been formed, the citizens are beginning to realize their conditions and possibilities, and when the next subsidy bill goes to a vote, she will no doubt be heard from. There are 46 lines of steamships plying between New Orleans and foreign countries, all flying foreign flags. Of these the few that are participated in by American companies are operating chartered foreign vessels under foreign flags, manned by foreign crews.

Only last September, at the visit of President Taft to New Orleans, the following letter was addressed to the Collector of Customs at that port by the Assistant Secretary of Commerce and Labor, in reply to a query:

> The Department has received your letter of the 9th inst., inquiring in behalf of the Entertainment Committee, whether there would be objection to the use of one or more foreign steamers to enable the President of the United States and his party, with delegates to the Waterways Convention, to spend three or four hours on October 30 in an inspection of the harbor of New Orleans and the lower Mississippi river.
>
> The Department prefers not to answer the legal question until efforts have been made, for which there is ample time, to secure American vessels for the purpose. It is reluctant to believe that at our principal gulf port American shipping has so dwindled that to enable the President of the United States and a relatively small body of representative Americans to spend a few hours on the greatest American river, with a view to its improvement, they must make the trip under a foreign flag.

This, at our principal gulf shipping port, in our greatest river, is a sufficient humiliation!

Only recently we celebrated the three hundredth anniversary of the discovery of the Hudson river at New York, and hundreds of

ships of all nations took part; and among all that shipping there was only one solitary merchant over-sea ship flying the stars and stripes.

The Oceanic Steamship Co. of San Francisco, operating under the Ocean Mail law of 1891, after five years of trial found itself in competition with foreign lines under disadvantageous conditions. The route was from San Francisco to Australia, via Hawaii, Samoa, and New Zealand, a distance of about 8300 knots. The following shows the conditions of the competition:

Line.	Nation.	Speed (Knots).	Subsidy.
Oceanic	American	16	$16,600.00
North German-Lloyd	German	15	41,600.00
French-Australian	France	15	47,800.00
Yokohama-Australian	Japan	14	21,900.00
Orient	England	15	23,000.00

Immediately upon the defeat of the Merchant Marine Commission's subsidy bill of 1907, five days after the adjournment of Congress, the Oceanic Company's ships were taken off their course and dismantled, their officers and crews were discharged, and they are now lying idle in San Francisco Bay, an object lesson for the Congressional Committee which visited that city on September 23 of this year, and saw thousands of tons of shipping that had been put out of business in the same way. The end of the Oceanic Line left us with no communication with Samoa, and the people of Hawaii were obliged to ask Congress to permit foreign vessels to visit their ports! Meanwhile the business between San Francisco and Australia has had to take a roundabout course in British and Canadian steamers, involving loss of time and of millions of dollars worth of commerce.

The port of Boston is operated upon by 25 foreign steamship lines, all the Boston agents being foreigners excepting *about* four, who are American agents of foreign companies. These agents are members of the Boston Chamber of Commerce and have, in the past, exercised a controlling influence therein with respect to shipping matters. A reliable correspondent says with respect thereto, "A few years ago persons interested in the American merchant marine signified to officers of this Chamber of Commerce that they would like to have a declaration in favor of national aid to the merchant marine. These gentlemen were told that it would be unwise to bring forward such a proposition to the Chamber—that while unquestionably the American majority of the members

favored it, the foreign interests would pack the meeting with their clerks and employees and defeat the resolution. Thereupon the effort to secure endorsement of the American flag was abandoned here, beneath the shadow of Bunker Hill." "Unquestionably the one greatest obstacle which we have to contend with is a tremendous political and commercial power exerted by the European steamship corporations in the United States." The above is quoted from one of the best informed men in this country on the subject.

There are six over-sea lines of steamers sailing from Baltimore, the agents of which represent foreign companies. My correspondent, in collecting information says, "The Maritime Exchange (supported largely by these people) was reluctant to assist me in this work . . . . they do not at all figure in the political activities of the city, but most of them are regarded here as public-spirited citizens." This is recognized as a sign that the usual thing has taken place in that city, as in other ports. Upon October 13 of this year the Shipping League of Baltimore was formed "for its special purpose of conducting an educational campaign in the South."

In Seattle there are 20 lines of steamers plying to foreign ports, and the agents of these foreign companies occupy the usual ratio of memberships in the Chamber of Commerce and the Merchants Exchange, as well as large commercial and political influences. My Seattle correspondent says: "It is a hopeful and encouraging sign to find a man in the navy who is anxious to help us. I have had rather disappointing experiences with our naval people heretofore, my encounters having been with officials of various rank, political and civil service; but have succeeded in accumulating but little assistance from those encountered. It seems to me there is a lack of sympathy in the navy with the work American business interests are endeavoring to promote for the betterment of our merchant marine. Moreover, I regret that I have frequently encountered officers who are inclined to belittle our efforts." I have quoted this so that naval officers may know what others are thinking, and may remedy this erroneous impression by showing at every opportunity that the opposite is true. Further he says that "all the lumber shipments from Puget Sound to Panama are made in foreign vessels, while at this time we have in excess of $3,000,000.00 invested in suitable tonnage idle and available for business."

The situation at Puget Sound in December, 1909, is fully covered by my correspondent in Seattle, which I have summed up in the following statements. A clipping from the Seattle *Post-Intelligencer* of December 8, 1909, states that 20,000,000 feet of Douglas fir have been shipped from Puget Sound to the Panama Canal during the past year and that much greater quantities will be shipped the coming year. The materials from the Pacific slope entering into the construction of the canal are confined almost exclusively to lumber. Almost every foot of it is handled by W. R. Grace & Co. (whose head firm is Grace Bros., London), who control also the lumber trade shipments to the west coast of South America, carried by many foreign tramp steamers under time charter. Be it known, then, that formerly the Panama trade was carried in American ships which are now lying idle. The rate then was $12.00 per thousand ft. B. M., disregarding lengths. Ultimately, the foreign vessels took up the trade and reduced the rates to $7.50 per M. The American vessels withdrew and took up the coastwise trade as far as the limited field permitted. After the American vessels were out of the way, two foreign competing lines gradually increased their rates until they have for some time back demanded $11.00 on lengths up to 40 ft., and higher rates for greater lengths, increasing up to $25.00 per M. for 60 ft. lengths—much greater on the whole than the former American rates.

Now let us draw aside the curtain and note how this foreign control is perpetuated. From the same source, which is in reality the work of the leading spirits of the Seattle Merchant Marine League, the following information was derived. This League had recently appealed to the Navy Department for protection by giving certain preferences to American shipping which it claimed in the American coal-carrying business from the East to the West coast of the United States for the use of the navy. Immediately thereupon, the foreign ship agents began to manipulate the political wires to counteract this demand. A circular letter was sent out from Portland, Oregon, dated October 14, 1909, addressed "to farmers and grain growers," pointing out and denouncing the action of the Marine League, and representing "that the fifteen steamers bringing coal last fall really carried their wheat to Europe, except one or two carrying lumber" (the facts show that only one of these vessels cleared with wheat), "and that but for the presence of these coal vessels the freight to Europe would

have been $1.00 per ton higher, or 3c. per bushel to each farmer for his wheat; that it was a case of Protection run riot, for the benefit of a few individuals of a ship trust, at the expense of the farmers."

These circular letters were sent out by Messrs. Balfour, Guthrie & Co. of Portland, without signature. This firm has its head office in London, and their local manager and all their employees hail from Scotland. They are the most extensive dealers in their line on the Coast, being grain buyers, brokers, and foreign ship operators; loading more than one hundred ships annually with grain for the United Kingdom.

This circular incited the farmers in Pendleton, Ore., to a meeting, and resolutions and protests, to the Navy Department and to members of Congress, urging a continuance of the employment of foreign vessels in this trade, and resolving that the Seattle Merchant Marine League was working in the interests of a "shipping trust." These resolutions were published in a number of the Sound papers and later an editorial appeared in the Oregonian, the most pronounced organ of the foreign shipping interests, haranguing the Congressman from that district by stating that he was present at the grangers meeting referred to, and that the writers of the editorial believed that he would be against the enactment of legislation favorable to an American merchant marine, or words to that effect.

In showing up the methods by which the foreign shipping interests manage to manipulate us, through our ignorance and the other weaknesses inherent in our representative form of government, I only need to refer to what action might be expected of either the legislative or the executive branch of the government when beset by such conflicting clamors.

From every port the answers come in the same—sentiments controlled by agents and interests of foreign steamship companies. The strongest foreign control exists in New York, Boston, New Orleans, Galveston, and Portland (Ore.). The last two ports are the most bitterly resentful of any proposal to aid American shipping. New Orleans is almost now a convert, Boston will soon be likewise, but the big fight is on in New York and she will ultimately vote for the stars and stripes, though maybe not right away. The foreign element is strong in the Chamber of Commerce, as is to be expected in our greatest shipping port, and the

shipping interests will use all their commercial and political affiliations, and press bureaus in New York and Washington, and subsidized papers throughout the country, to fight the growth of American shipping unto the last ditch. Untold millions are at stake. New York is to-day the world's greatest shipping port.

Just at the time of this writing, at a meeting of the New York Chamber of Commerce, held upon December 16, 1909, resolutions favoring ship subsidies, discriminating duties, and free ships, were voted down. A special meeting had been called for the purpose of passing upon the favorable report which had been made by a committee of the Chamber, American friends of our merchant marine, the object being to formulate resolutions favoring the ship subsidy propaganda for the action of the present Congress. Of that meeting my Boston informant says: "New York merchants present at that meeting of the Chamber of Commerce, when the shipping resolutions were voted down, state that the meeting was crowded with foreign ship agents and ship brokers. The principal speaker against the resolution was Mr. E. H. Outerbridge, who is a Canadian, a brother of Mr. A. E. Outerbridge, the head of the Quebec Steamship Company, a British concern operating in the West Indies British ships which would be swept off the sea by high-class American steamers." A substitute resolution in favor of discriminating duties was first voted down; then the amendment for free ships adopted and the entire subsidy resolutions, including this amendment, were voted down. The New York *Journal of Commerce* in commenting, with evident satisfaction, upon these results, had the following to say: "The heartiness with which the original action on the amendment was taken leaves no doubt of its genuineness."

The foreign shipping organs in New York are said to be the New York *Commercial Bulletin* and the New York *Journal of Commerce*. It is alleged that marked copies of specially prepared anti-American-shipping editorials and articles are sent out from these papers and circulated in the West and South for prejudicing the press and public opinion in these districts, and are mailed to members of Congress and others in position to prevent legislation; and that the papers in the other ports most notably under the influence of this control are the New Orleans *States*, the Galveston *News*, the Galveston *Post*, and the Portland *Oregonian*, the latter being represented as the most bitter. *The American Flag* also

asserts that the "agents of the foreign steamship companies fairly swarm in Washington," and "have been able to influence a few Washington correspondents." The New York agents are headed by Mr. Gustav H. Schwab, resident-director of the North German-Lloyd Steamship Co., and Mr. Emil Boas, resident-director of the Hamburg-American Line. Whenever we have had a convention to advocate American shipping, such gentlemen have been on hand, as delegates, as big as life, to advocate the contrary, and control the sentiment against ship subsidy.

Such was noted at the National Convention for the Extension of Foreign Commerce which met in Washington, January 14, 1907—gotten up by the New York Board of Trade and Transportation—where the foreign steamship interests were led by Mr. Gustav H. Schwab. There was present a certain ex-naval officer, who spoke in advocacy of "free ships." This same gentleman has very recently been before the Waterways Convention at Norfolk and the Society of Naval Architects in New York, and the New York Chamber of Commerce, preaching the doctrine that ship subsidies are unconstitutional and advocating "discriminating duties." Clause 3, Sec. 8 of Art. I of the Constitution gives power in perpetuity to Congress "to regulate commerce with foreign nations, and among the several States, and with the Indian tribes." Subsidies were voted and paid under the laws of 1845 and 1847, and the Senate has repeatedly voted for a subsidy bill and the Senate lawyers have never seriously raised the point that subsidies are unconstitutional. The Supreme Court has held that, wherein the Constitution does not expressly prohibit, Congress has inherent power to legislate. Why then these preachments to raise a doubt about a thing about which there is no room for doubt? Why also the urgency of a practical man to persuade public opinion to undertake legislation by impracticable and ineffective discriminating duties? Why should a reputed shipbuilder advocate a scheme which, in effect, protects every American industry excepting his own?

But, reverting to these foreign agents, the report of the Roosevelt Merchant Marine Commission said: "The foreign ships which now convey nine-tenths of our ocean commerce are invariably built abroad, officered abroad, manned abroad, repaired abroad. If they can possibly help it, they never use a pound of American material, except coal, or yield so much as a dime to

American labor, beyond the stevedores. The managers of these foreign steamship companies are, as a rule, aliens, sent over to the United States. The very clerks in the offices are, as far as can be, brought from Europe. These foreign steamship agencies are virtually little European colonies on American soil; their fixed determination seems to be to exclude Americans by birth from all share or knowledge of the ocean shipping business.

"It has been testified before the Commission that not only do foreign ships, sent over here to engage exclusively in American commerce, bring officers and crews under long contract from home, and return home for all important repairs, but that many actually refuse to purchase food and other supplies here in the best and cheapest market. These vessels arrive loaded with home provisions and other material that are placed in bonded stores here and withdrawn from time to time as they are needed, so that so far as possible not one penny of money earned by these foreign ships in American trade shall return to the channels of American commerce."

Before quitting this section it will suffice to relate briefly the conditions of our trade with South Africa and South America. There are no American steamers to South Africa, but all our trade is carried in foreign subsidized lines. The Canadian government subsidized a line in 1901 and has built up a large trade with South Africa, and the shipping rates quoted in 1905 were $4.26 a ton from Montreal to Cape Town, whereas the rates our merchants paid from New York to Cape Town were $6.70 a ton; the Canadian rates being $2.00 or $3.00 a ton cheaper. Evidently, under these conditions, we can only get that portion of the export trade which Canada cannot supply.

Our trade between the Atlantic Coast and South America now equals about $250,000,000.00 a year, notwithstanding the very limited facilities for direct shipment and the large amount shipped via Europe, all in foreign bottoms. The total trade of South America with other nations is very much greater than this and is increasing at the rate of $100,000,000.00 a year. We are only getting the left-over portion of that trade which Europe cannot supply. Twenty years ago New York merchants built and operated a Brazil line to get some of this trade, but found they could not compete with the foreign subsidized lines; they appealed to Congress for a subsidy which was refused, and the line shortly

went out of business. Thereafter, whenever our business men wished to visit South America to build up their trade, they found that to make connection with reasonable comfort and dispatch they were forced to go via Europe, thereby twice crossing the ocean, and returning the same way. Likewise their shipments had to be sent by the same circuitous route. Only one American line, the Red D Line, goes as far south as Venezuela, that line profiting from the mail subvention of 1891. Not one American ship goes to Brazil, Uruguay, Argentine, Chili, Peru, or Ecuador. Of the steamer lines and tramps under foreign flags that ply direct from the United States to South America, they are slow, uncertain and inefficient; they are taken unceremoniously away if needed for the European trade and are not to be depended upon; some of them are as slow as 8 or 9 knots, yet the rates are nearly double those of the fast and elegant steamers between Europe and South America. The Brazilian shipping combination, comprising the united foreign steamship companies that control the shipping trade between the United States and Brazil have formed a shipping ring, and squeeze out all competitors by Standard Oil methods. They have charged 40 cents a bag and 5 per cent primage for coffee to this country, and when a tramp comes by and offers to take it for 20 cents, they cut to 10 cents to get the shipment, and afterwards boycott the merchant into submission next time, refusing him reduced rates which are, at the right time, offered to other shippers.

At the first Pan-American Conference held in Washington many years ago, Mr. James G. Blaine presiding, Argentine agreed, at the suggestion of the United States delegates, to assist the United States to subsidize a mail line between New York and Buenos Ayres; that country afterwards passed the law, but ours failed to do so, and the scheme fell through. Argentine has now a trade of over $800,000,000.00 a year with other countries and we only get about $100,000,000.00 of it.

Every one of our European rivals in trade have fast fine subsidized steamer lines to South America; Great Britain had subsidized heavily in the past; also France; and Italy has five new 10,000-ton ships sailing from Genoa; Germany has forty-three large steamers, and more building, mostly to Brazil; even Portugal and Sweden have subsidized lines; and Japan has subsidized lines in the Pacific. Only the United States stands aloof, and yet we are

the altruistic goose of the Monroe Doctrine. European countries might as well own South America for all our Monroe Doctrine, since such ownership could have no other ultimate aim than to secure for the owners the advantages and profits of trade to the exclusion of ourselves. We dominate this hemisphere of influence with our Monroe Doctrine to the same extent as the control of the Pacific and the Open-Door of China, and contribute the whole to the trade of other nations, with the Panama Canal thrown in for good measure; or, in other terms, we dominate nothing, but only the "big talk," while European nations are busy collecting up the golden eggs we are producing for their benefit.

I might retail further the multitudinous ills to which our shipping is subject, and the devious ways in which the foreign control is extended and perpetuated, but may sum up the situation with more brevity by the reminder that such depredations are to be expected as a natural result of the laws and forces acting against any homeless enterprise which is unprotected. In our tariff laws, we have protected all other enterprises in this country; our shipping we have refused to protect. The policy of a protective tariff, erstwhile partisan, is now national, and may be considered as a permanent institution. How foolish it is, then, for any American not speaking for the foreign shipping trust, to advocate withdrawing protection from our other enterprises as a means of protecting the only one left unprotected; in other words, that because of the higher cost of labor and materials in this country to build and operate ships under the American flag, due to the tariff, therefore reduce the tariff so that no business will be protected! That line of foreign-inspired talk is now well nigh out of date in this country. The only way to protect our shipping is to do it. The Trans-Mississippi Congress of merchants and farmers in 1903 struck the keynote when they resolved that "it is as absurd for the United States to depend upon foreign ships to distribute its products as it would be for a department store to depend upon the wagons of a competing house to deliver its goods."

A report of Senator Gallinger, chairman of the Senate Committee on Commerce, says: "The decline of our ocean shipping, our one unprotected industry, has ruined shipowners and shipbuilders alongshore from Eastport to Galveston and from San Diego to Puget Sound. It has impoverished and scattered our shipyard mechanics, the most skilled in the world. It has robbed the country of the hardy officers and seamen who should constitute our

naval reserve; but it has done more than this—it has choked the normal growth of the export trade of the United States to four of the five other great continents. Therefore, there is not a wheat farm in the Dakotas, a cattle ranch in Texas, or a cotton plantation in Mississippi, Georgia, or the Carolinas, where the loss of American shipping has not made itself felt in shrunken sales and opportunities for profit."

EFFECT OF THE TARIFF.

The relative cost of wages to operate ships may be indicated by comparing the American *St. Louis,* a smaller ship, with the larger British *Oceanic* and the German *Kaiser Wilhelm der Grosse:*

	German.	British.	American
Number of officers and crew.....	500	427	380
Wages, cost per month to operate.....	$7,700	$9,900	$11,300

The available statistics show 50 to 100 per cent greater cost to operate American ships, man for man; the cost of food on American ships is 25 to 50 per cent greater. To build the ships the cost of shipyard labor is 50 to 100 per cent higher, and of materials 20 to 25 per cent higher; that of repairs is upon the same scale. In order, therefore, to protect our shipping it is necessary to offset this difference in cost by means of a subsidy sufficiently increased to permit our ships to operate in competition with foreign ships at as cheap or cheaper rates with faster and better ships. To do this will necessitate also that the grant should include a sufficient subsidy *per se* to offset the subsidy enjoyed by the foreign ship. Furthermore, the foreign lines, being already established in trade, may be able to operate upon reduced subsidies, whereas to build up our trade and until we should get a good start will require increased subsidies, for such is the rule of trade as found by the results of all experience. At first the subsidies must be in greater proportion, later they may be reduced as determined by the earnings, the measure of reduction being determinable from the volume of the trade and the excess of profits, which should for that purpose be accessible to the government. It will cost money to do this, and there isn't any slick trick of legislation which will bring it about without paying the price. Various people, foreign-inspired and otherwise, advocate various remedies, such as free ships, free trade, and discriminating duties; but all of these propositions are quack remedies, and cannot effect a cure, as shown in the following.

QUACK REMEDIES.

Free Ships.—A definition of the "free ship" policy is, that the country adopting it passes laws permitting its government or its citizens to purchase ships, either merchant or naval, from other countries and enter them into the home service, or home registry, without any charges for the privilege. In reality, it is a trick invented by England as a means of fostering her ship-building industries in building the ships of all countries. In the years between 1840 and 1860, during the transition from wooden sailing to iron steamships, England heavily subsidized her steamship lines, which gave iron ship-building and steam-engine building such an impetus in British yards that other nations could not compete with them. Shrewdly foreseeing this result, England adopted the free ship policy, and then encouraged other nations to do likewise, with the results that all important maritime nations did so, except the United States; and since that time English shipyards have flourished not only upon the subsidized British ship-building, but also upon the building of both merchant and war vessels for most of the other countries. England, however, never intended to buy ships built elsewhere and never did so, her free ship policy being a free ship myth except as a trap to catch the ship-building of other countries; and in her recent subsidy to the Cunard Line it was expressly stipulated that the ships thus affected should be "built in the United Kingdom," even though the free ship policy still remains upon the statute books.

France followed England's lead with the free ship policy and had her ships built in British yards; that had the effect of placing the French shipyards into discouragement which had its inevitable effect upon the shipping output, and France, in 1881, found her merchant marine decreasing and her shipyards in such poor shape that she found it difficult to get new battleships without going to England for them also. This weakening of the other countries was, no doubt, among the results hoped for by Great Britain. France, realizing that England had tricked her, then began to retrieve herself by subsidizing and building her own ships, which she has since done. Germany had the same experience, and bought both her merchant and war ships in England, and found that to build up her own shipyards she must subsidize her shipping and carry along her shipbuilding industry as a necessary adjunct thereto, if she wished to become independent of England, which

she has done since 1881. So likewise with Norway, Italy, and Japan. It is thus proved by experience that the free ship policy is valuable only for us to find out all about, in order to avoid having anything to do with it.

If this country should adopt the free ship policy, and we should have our merchant ships built abroad and entered under American registry, that would have the effect of leaving our shipyards unprotected against foreign competition, and the ships themselves would still have to be subsidized to offset the additional cost to operate under the American flag as well as to offset the foreign subsidy; hence free ships would only complicate our ills. In 1904, the Roosevelt Merchant Marine Commission visited twenty-one of our principal sea ports, and took the testimony of over three hundred shipping experts, and out of all these only one or two were found who asserted that American registry would be sought even if the ships could be built abroad. Besides, any scheme to upbuild our merchant shipping by leaving our shipbuilding industries unprotected, can only cripple one of the essential elements, and must necessarily tend to defeat the objective sought, as in the case of France and Germany described above. The recent financial difficulties of our own shipyards are cases in point. Free ships are out of the question.

Free Trade.—Free trade, like free ships, is another British-invented myth to catch other nations' trade with. It means, in reality, that its advertisement shall serve England to make free with the trade of other nations. Of course England may not have sufficient reason to protect the industries of her small island by a tariff wall as we do, but instead she protects her main industry, the shipping business, to the limit; and from the control of the trade thus obtained she extracts far more profit than a tariff could possibly supply. Both the shipping and the shipbuilding of England are more highly protected, and this protection is more rigid, than in any other country in the world. The British government does not permit of the use of a single article of foreign manufacture in the construction of its naval vessels or its merchant vessels that have mail contracts. Yet that country advertises itself as being an adherent of free trade. Even in this country of high protection, though the materials of our naval vessels must be of domestic production, yet all other ships may be made of foreign materials by payment of the duty on them. England, therefore, is

more rigid than we are, and if we take into account the fact that the greatest part of the British population is engaged either in shipping or shipbuilding or in furnishing materials for shipbuilding, the great extent of British activity covered by this protection is all the more apparent. In fact, the whole of Great Britain is more or less an immense shipyard and shipping point, loaded to the gunwales with protection and subsidies. The tariff, therefore, on imported shipbuilding materials is absolutely prohibitive; and if there is no tariff upon the balance of her imports it is because she chisels the profits off said imports while en route to England, instead of at the point of landing. To say that England practices either free ships or free trade is mythical, and no one in this country now believes in free trade.

Discriminating Duties.—From the fact that our early successes in the shipping industries were due to the practice of discriminating duties together with bounties upon export dried and pickled fish, and upon the fishing vessels and fishermen engaged therein (acts of 1792 and 1813), some people profess to believe we should return to the same expedients as the proper solution of our difficulties. Times have changed, however, and discriminating duties are as out of date as piracy. Aside from the forty reciprocity treaties, containing the "most favored nation agreements," we have made with various countries since those times, and aside from the fact that all nations that have experimented upon those lines have been forced to abandon, and have actually abandoned, the practice, I need only recall that we ourselves were forced to abandon discriminating duties on British ships as a result of the War of 1812. It would seem useless, therefore, to hunt for other reasons against an obsolete and impracticable procedure. There are many people, however, who profess to believe that what we did successfully once we can do again; that the reciprocity treaties can be dissolved after a year's notice; and that the probabilities of retaliation have no fears for them. To all such let it be known that this "policy of the fathers," even if reverted to, cannot cope successfully with present-day conditions. This practice consisted in remitting 10 per cent of the tariff duties upon goods imported in American bottoms. Evidently, then, the inducement led only to ships on the homeward trip; that is, one way. Subsidy works both ways, both going and coming. A 10 per cent reduction on the duties can be met by a foreign subsidy sufficient to permit the

foreign vessel to reduce its rate to more than offset the amount of the discrimination, and still get the shipment; subsidy, once the practice is established, is more flexible in controlling the trade than is a readjustment of tariff rates with all the intricacies involved. Besides, the routes of shipment, and the class and sources of imports are very different nowadays from the days of discriminating duties, and the tariffs are not equalized or adjusted so that the benefits of discriminating duties could be distributed in the proper proportions to encourage all lines of trade alike. In the old days practically all our imports were dutiable, so a remission of duties was distributed. Nowadays, the free list of non-dutiable imports is very large, and to meet success in this application the free list would have to be abolished. About 35 per cent in value and 65 per cent in bulk of our imports are on the free list. Of this, nearly all our imports of raw materials, 82 per cent from South America, and 94 per cent from Central America, are on the free list. These countries we are the most anxious to build up a shipping trade with, and discrimination duties could be of no avail there. On the other hand, our imports from Europe are all dutiable except 28 per cent, and from the West Indies all but 17 per cent. A remission of 10 per cent of the tariff, therefore, would have the effect of rewarding 83 per cent of the import trade from the West Indies, 72 per cent from Europe, 18 per cent from South America, 6 per cent from Central America, 50 per cent from China, 36 per cent from Japan, and 31 per cent from India. Undoubtedly, to distribute the rewards by this method so as to actually build up and maintain steamship lines in competition with foreign subsidized lines, not only would the free list have to be abolished, but the whole scheme of tariff rates would have to be readjusted with that end in view. A remission of tariff duties to the shipper is the equivalent of giving him that much money out of the treasury, and is in reality a subsidy; for whether a subsidy be given in the form of a remission of tariff dues before the money equivalent goes into the treasury, or whether given as a subsidy direct with the money after it has reached the treasury, it is all government money nevertheless, and will require the same amount whether applied the one way or the other, to do the work. Why, therefore, should we quarrel with terms, or meddle with impracticabilities, or trifle with obsolete and unpopular discriminating duties when we can, for the same money in the form of subsidies,

get the results we want without taking any chances. If this great country can't go straight down into its pocket and pay cash for the thing that will have to be bought with money anyhow, it would better go out of business.

CHEAP AT THE PRICE.

At the present time the sum total of our exports amounts to about $1,750,000,000.00 in value, and our imports $1,250,000,000.00, the difference in our favor being $500,000,000.00 which insures our prosperity. This balance, however, is diminishing rapidly, but out of it we are paying $300,000,000.00 a year to foreign steamship companies to carry these imports and exports for us. The annual profits from our foreign mails amount to from $6,000,000.00 to $8,000,000.00 a year; the amount we now pay to American steamers is about $1,500,000.00, and to foreign steamers is about $1,225,000.00, to carry these mails. In order to capture all this business for American vessels the Roosevelt Merchant Marine Commission's subsidy bill offered to subsidize twelve lines of steamers at a cost to the treasury increasing by about one-and-one-half million dollars a year for ten years, the total cost at the end of ten years being only about seven-and-one-half million dollars. The ships were to be suitable for naval purposes, and the crews available for the naval militia. That bill and the subsequent modified bills of more modest proportions, have gone down to defeat before the avalanche of criticism engineered by the subsidized agents of the foreign steamship interests. We are truly a nation without foresight, as weak in defending ourselves against the trade depredations of outside nations as is China to defend herself against the onslaught of military powers, doubly weak, because our wealth is greater than that of all other nations combined.

WHAT OTHER NATIONS ARE DOING.

England.—Great Britain began paying subsidies about the year 1840, and has since that time paid out upwards of $300,000,000.00, which is far more than any other nation. It coincides with the amount now being paid by this country to foreign steamship lines to carry our ocean commerce each year. England subsidizes thirty steamship lines, belting the entire world. The subsidy payments amount to about $6,000,000.00 a year, not including the recent

$1,100,000.00 grant to the Cunard Line. Besides the above mail subsidies there are admiralty subsidies to fast steamers and retainer bounties to 33,500 merchant seamen and fishermen of the royal naval reserve. The great number of tramp steamers, while not directly subsidized, are indirectly the product of the subsidy system; since, on the one hand, they represent the economical resultant of the shipyard surplus of labor and materials, while, on the other hand, they are owned in great part by subsidized lines and are operated to supplement the regular service in carrying the trade built up by the subsidized lines. England recently subsidized the Cunard Steamship Co. by making it a gift of the two magnificent transatlantic liners *Mauretania* and *Lusitania*, and of an additional sum of money under the following conditions: these vessels were to be built in England of British labor and materials at a cost of $6,500,000.00 each. For this purpose the government loaned the company the necessary $13,000,000.00 at 2¾ per cent interest for a period of twenty years; that is, a return payment of $357,500.00 per annum, or a total of $7,150,000.00. To offset this, the government first gave this company a subsidy of $750,000.00 a year, afterwards increasing it to $1,100,000.00, the amount at present allowed.

France.—The mail subsidies are about $5,000,000.00, and the navigation and construction bounties about $3,500,000.00 additional, per annum. France abolished discriminating duties and adopted the "free ship" policy in 1866, with the result that her ships were built in England, which proved ruinous to the French shipyards. In 1872 discriminating duties were re-established, but other nations, including the United States, retaliated, so she returned to the "free ship" policy, and in addition gave subsidies to mail lines, and bounties to shipyards and seamen. Her tonnage has been greatly increased, great shipyards have been developed, and a naval reserve of officers and seamen created.

Germany.—Germany first tried the "free ship" policy which killed her shipyards while her ships both merchant and naval were built by England. In 1881, at the instance of Bismarck, subsidies were begun and now amount to about $3,000,000.00 for mail service; in addition, the shipyards are subsidized by the aid of the State railways which haul shipbuilding materials at cost, and which give preferential rates to goods for export by German steamers.

Evidently, from the experience of France and Germany with

"free ships," and the present resultant bounties on construction obtaining in both countries, it is certain that any system of protection to shipping which excludes the shipyards is bound to be disastrous not only to shipbuilding, but also ultimately to the shipping itself.

Italy.—First tried "free ships," but like France and Germany had to turn to subsidies to prevent a total depletion of her shipyards. The total subsidies now amount to about $3,000,000.00 a year.

Japan.—Tried "free ships," but now subsidizes to the extent of $6,200,000.00 a year, builds her own ships in her own shipyards, and gives bounties to her naval reserve and fishermen.

Russia.—Russia is in the same class with the United States; she adopted the "free ship" policy, and her native shipbuilding has been smothered. Recently she has subsidized to the extent of $2,000,000.00 a year, more than the United States pays for mail subsidies.

Several of the smaller nations subsidize, where they have any shipping worth mentioning.

THE NEEDS OF THE NAVY.

Our own merchant shipping has been so sadly neglected that when our fleet recently made the tour around the world it was attended by twenty-seven colliers flying the flags of foreign nations. In case of war, that number would be only a fraction of what we might need throughout a conflict, and unless we have subsidized merchant ships and crews convertible into war purposes, the left arm of the navy, which I shall term the merchant marine, will be crippled, and consequently the force of the navy much modified and diminished.

As indicating the needs of the navy in merchant shipping, the following is quoted from a report of the General Board of the Navy Department, dated November 23, 1905:

Sir: In compliance with the Department's endorsement dated October 20, 1905, referring to the general board for report and recommendation a letter from Senator Gallinger, chairman of the Merchant Marine Commission, to the Secretary of the Navy, in relation to the extent and character of the merchant marine that this nation should possess to supply its possible needs in time of war, as viewed from a military standpoint alone, the general board has the honor to submit the following:

The need of auxiliary vessels in time of war for military service is felt both by the army and the navy. . . . . Vessels other than the fighting fleet which would be needed by the Navy Department in time of war, and which would largely be drawn from the merchant marine, may be classed as follows: Scouts, colliers, ammunition ships, supply and refrigerating ships, distilling ships or tank steamers, hospital ships, repair and torpedo depot ships, transports, dispatch vessels, tugs. . . . . It is, of course, impossible to foretell the extent of the needs of the navy in any future war, they being dependent altogether on the size of the United States Navy at that time and the nature of the campaign to be carried out; but summarizing the above, the number of auxiliary vessels necessary for naval purposes would be, roughly, as follows, basing the number upon a squadron of eight battleships with attendant cruisers, torpedo-boat destroyers, etc.:

20-knot scouts, 8 for each squadron.

15-knot squadron colliers, 5 for each squadron.

Slower colliers, dependent upon circumstances. Say, roughly, 5 for each squadron.

15-knot ammunition ships, 1 for each squadron.

12-knot supply and refrigerating ships, 1 for each squadron.

12-knot tank and distilling ships, 1 for each squadron.

12-knot hospital ships, 1 for each squadron.

12-knot repair and torpedo depot ships, 1 for each squadron.

18-knot dispatch boats, district scouts, etc., 2 for each squadron; 5 for each naval district (10 naval districts).

12-knot transports, 6.

Tugs and steam lighters, 2 for each squadron.

Tugs, 100 for navy yards and naval districts.

If the United States should go to war when the vessels now authorized by Congress are completed the navy would then possess 27 battleships in addition to cruisers, coast-defense vessels, torpedo-boats, etc., and with the following auxiliaries now built or building: 3 scout cruisers, 2 squadron colliers, 16 slow colliers, 3 supply ships, 1 tank ship, 2 hospital ships, 1 repair and distilling ship, 6 transports, 23 dispatch boats and yachts, and 43 tugs.

It is thus seen that the Navy Department would be compelled to secure from the merchant marine, following the proportion of auxiliaries given above: 24 scouts, 16 squadron colliers, 2 slow colliers, 5 ammunition ships, 2 supply and refrigerating ships, 4 tank and distilling ships, 2 hospital ships, 4 repair and torpedo depot ships, 34 dispatch boats, district scouts, etc., and 78 tugs.

In order to be sure that this number of vessels would be available for immediate purchase of charter by the Navy Department at the outbreak of war, the number of American-owned merchant vessels of each type should be largely in excess of the number here given, as some vessels would be abroad when needed, some under repairs, and some should be left for carrying on their regular commercial runs and as a reserve from which to draw in case of necessity.

The number of auxiliary vessels obtained by the Navy Department by purchase, charter, or loan at the time of the Spanish war is shown below:

		Purchased.	Chartered.	Loaned.	Total.
Vessels converted into auxiliary cruisers		7	4	..	11
Colliers		20	..	..	20
Vessels converted into auxiliary gunboats	Special Types.	3			
Tank or distilling ships	Special Types.	4			
Supply and refrigerating ships	Special Types.	6			17
Hospital ship	Special Types.	1			
Repair ship	Special Types.	1			
Transport	Special Types.	1			
Converted yachts		26	..	2	28
Converted tugs		27	..	..	27
Total					103

. . . . . Summarizing, the general board considers that, from a military standpoint, a bill which would encourage the building of large fast vessels suitable as auxiliary cruisers, scouts, and squadron colliers would be of great advantage as assuring to the Navy Department means of obtaining necessary auxiliaries in time of war important as affecting the operations of the fighting fleet. . . . . Another benefit which would accrue to the navy from a large fleet of American-owned merchant vessels would lie in the large number of experienced seagoing men, engineers, and firemen accustomed to marine engines and boilers, who would form a valuable reserve from which to draw the men for manning the auxiliaries.

The report of the Army War College, upon the same subject, dated December 22, 1905, contained the following statements:

Sir: The special committee appointed to prepare a report on the letter of Senator Gallinger to the Secretary of War, on the subject of the merchant marine in its relation to military transport, has the honor to submit the following report:

In any military enterprise involving the movement of troops over sea, the matter of first and paramount importance is the transport. The primary requisites of sea transports are sufficiency, suitability, and readiness. The secondary consideration is cost—secondary not alone because war is ill adapted to economical prosecution, but also because in preparing for war it is generally true that the worst way is the dearest and the best is the cheapest; the worst being a procrastinating, unready policy of penury during peace and prodigality during impending or actual hostilities, the net result of which is equal or greater ultimate expenditure and much less value received. . . . . With the regular army at its present authorized strength, it is an outside assumption that two divisions could be made ready to embark in fifteen days. Hence, 20 of the larger and 18 of the

smaller ships available in fifteen days would meet the probable needs under this category.

As an expedition may be necessary from either the Atlantic or Pacific coast, and as ships in either ocean cannot possibly be made available in fifteen days for an expedition from the other coast, there should be on each side a number of suitable ships afloat, such that the numbers specified above can be obtained within the time stated. Supposing these ships to be engaged in foreign trade, it is not probable that more than one-third of those in either ocean could be obtained and made ready in fifteen days. Assuming this ratio, it follows that to provide suitable ships for a rapid movement of two divisions from either coast, there should not be less than 60 of the larger and 54 of the smaller size afloat in Atlantic and the same in Pacific waters, or 120 of the larger and 108 of the smaller size in all, an aggregate of 228 vessels.

Larger expeditions will require a longer time to prepare and will give a longer time to collect ships, causing a larger proportion of those afloat to be available. The total capacity of 228 ships would be about 225,000 men of all arms, completely equipped. The number of ships above indicated and of the kind described will permit an expedition of 225,000 men, or any less number, to sail as soon as it can be made ready to embark, without delay on account of sea transport.

The aggregate gross measurement of 228 ships of the size indicated above is 1,368,000 gross tons. The official list of merchant steam vessels for 1904 shows 57 seagoing ships of 4000 gross tons and upward, with an aggregate tonnage of 400,000. This includes the very fast American liners, which would doubtless be required by the navy for scouts, and also some very large ships which would not be generally serviceable. Of these ships 8 are substantially of the smaller and 9 of the larger sizes described. The others vary in size and proportions to such an extent as to make it unsafe to adopt factors smaller than 4 gross tons per man and 10 per animal in gauging their capacity. With these factors a division would require 116,000 gross tons of transport, and two divisions—the force previously discussed as a first expedition to be dispatched at once—will require 232,000 gross tons, selected from this list of ships. In short, to strike the quick force of a blow corresponding to our permanent military establishment would require practically all the American shipping of suitable character in Atlantic waters and more than the entire tonnage in Pacific waters.

There needs no argument to show that this transport tonnage could not be procured in fifteen days. It is doubtful whether it can be procured at all, except by impressment and in a period of six months or more. For the transportation of the Santiago expedition in 1898 the Quartermaster's Department chartered every American vessels that could be obtained in the Atlantic ports during the twenty days following the declaration of war and succeeded in obtaining a fleet of 36 vessels, averaging 2500 gross tons. But two of these were over 4000 tons. The ships had an aggregate capacity of 90,000 gross tons, or less than one-half the quantity required to

embark a force of two divisions. The expedition was fitted out for a definite voyage of thirty hours from Tampa to Habana. Circumstances finally determined that the voyage should be one of eight days to Santiago. The official records afford ample evidence that the safe arrival was due to the good fortune of continued fine weather. A severe storm encountered would have scattered the fleet, probably with great loss of life, and would have defeated the object of the expedition. There is nothing except its successful arrival to justify its departure. . . . . This condition cannot improve until the American steam seagoing merchant marine has increased in tonnage to approximately two and one-half times its present volume by the addition of ships adapted in size and design to quick conversion into suitable transports and built under conditions which make their voluntary surrender to the United States on demand a foregone conclusion.

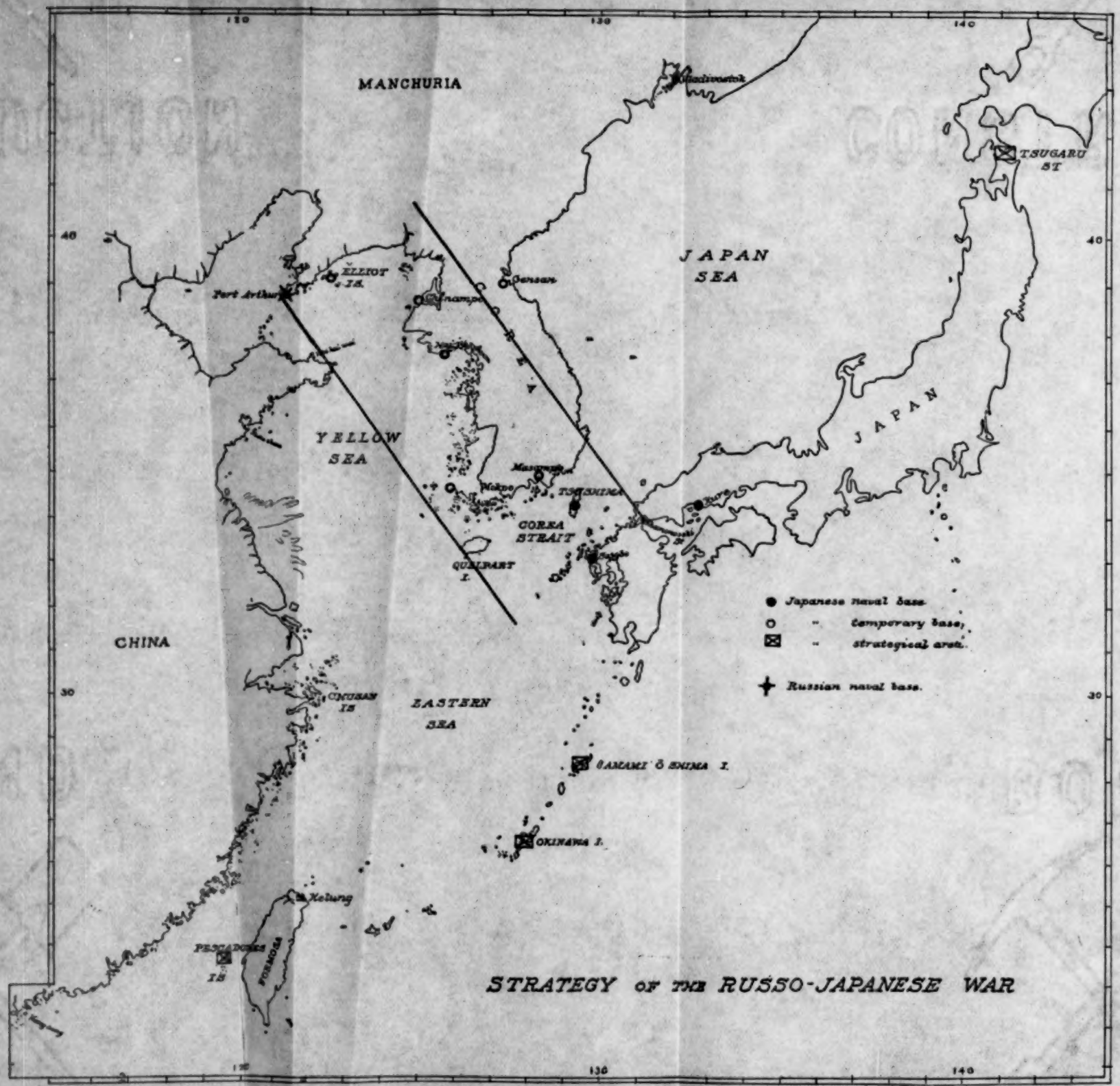
So far as concerns the interests of military transports, any subvention, subsidy, or other assistance rendered by the United States to the American merchant marine will produce the greatest return for the money expended if the legislation is so framed as to require or strongly encourage the construction of ships of the two sizes and with the proportions and arrangements described in this report.

THE NAVY LEAGUE.

I have endeavored to portray, in the foregoing, the many ills with which our merchant marine is afflicted and the consequent weakening effect upon the navy; and it ought to be evident to anyone that the navy and the merchant marine are essentially dependent upon each other, each being the necessary supplement of the other, without either of which this country can ill afford to be found. The interests, therefore, of the Navy League and of the Merchant Marine League lie along the same directions, and they interlock and overlap at vague and indistinct lines of separation; so that, in reality, they should be found marching hand in hand both working for the upbuilding of the merchant marine and the upbuilding of the navy. The Navy League has had an easy task in behalf of the navy, the popularity of which has probably needed no seconding. On the other hand, the Merchant Marine League of the United States sorely needs the practical assistance of the navy and of the Navy League in its uphill fight for a decent merchant marine. This Merchant Marine League was established at Cleveland, Ohio, in 1904, in continuation of the work of the late Senator Marcus A. Hanna, and has ever since been engaged in a campaign of education for the purpose of restoring the American flag to the high seas. At the present session of Congress the

Humphrey subsidy bill[1] will either pass, or subsidy legislation will again meet a material setback; if it passes it will be the entering wedge and should be followed up by additional legislation. A magnificent opportunity is thus opened for the friends of the navy to strengthen the navy's left arm, and uplift the merchant marine —a work more promising than any other line of effort now within reach. What has the Navy League done, and what will it do? What can the navy do to lift up the stars and stripes now drooping over the last remnants of our merchant shipping?

[1] Later advices indicate that the Humphrey bill contains two adverse clauses (1) for free ships, pointed against our shipyards; and (2) the clause prohibiting subsidies to steamer lines having trade relations with railroads, pointed against the Hill and the Harriman steamer lines of the West coast. That is the kind of *protection* our shipping has been dying of; help, not hindrance, is the need.


MANCHURIA
Vladivostok
TSUGARU ST
JAPAN SEA
Gensan
Port Arthur
ELLIOT I.S.
Chemulpo
JAPAN
YELLOW SEA
Masampo
Moji
TSUSHIMA
Kure
COREA STRAIT
QUELPART I.
Japanese naval base
Temporary base
strategical area
Russian naval base.
CHINA
CHUSAN IS
EASTERN SEA
OSUMAMI & SHIMA I.
OKINAWA I.
Keelung
PESCADORES IS
FORMOSA
STRATEGY OF THE RUSSO-JAPANESE WAR

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HONORABLE MENTION.

THE NAVAL STRATEGY OF THE RUSSO-JAPANESE WAR.

By LIEUTENANT LYMAN A. COTTEN, U. S. Navy.

Motto: There are certain teachings in the school of history which remain constant.

The literature bearing upon the Russo-Japanese War began to appear almost with the outbreak of hostilities early in February, 1904, since when much has been written of interest to naval officers on various questions pertaining to the war. Notwithstanding the amount that has been written, it cannot be said that the subject has been exhausted. To those of the profession of arms in the service of neutral nations a war is as a complicated surgical operation to the medical student, something to be viewed from all points, studied with painstaking care, and thought over again and again until each step becomes as familiar as the most commonplace subject. A war, however, is of much rarer occurrence than a surgical operation, and, instead of one life, involves the lives of many, and possibly the very life of a nation itself. Hence, that one may become qualified to conduct war, it becomes all the more important that each and every preceding war be studied to the utmost, raking over many times the embers, as it were, that no possible particles of valuable knowledge be left undiscovered. The result of a war is always widely disseminated, but the reason for such a result is often not so apparent. To one wishing to learn the science of war, results without reasons are of little utility, and the all important question is "What caused such results?"

It seems strange that a subject of such importance in its bearing upon results as the *strategy* used by the two combatants in the

Russo-Japanese War should have been so consistently neglected by naval writers, but such is the case. The tactics, international law, logistics, gunnery, matériel and personnel, each has been extensively studied, and discussed in many languages, but nowhere does one find anything upon the naval strategy of the war, viewed from the standpoint of strategy *per se*, though, of course, strategy is intermixed often with other subjects. Hence this modest attempt to analyze briefly the chief features of the war, to see what, if any, *strategical* lessons may be learned from the application of new principles or the adaptation of old ones, and particularly whether these lessons have a special application to our own country.

In attempting to make a study of this subject, one is immediately impressed with the paucity of reliable data. Both the Japanese and Russian archives remain closed, with their secret reports and documents inaccessible to outsiders. Usually writers on strategy wait for such secret papers and documents before attempting to draw deductions, but by doing so, much that is gained in accurate knowledge is lost in vital interest through the lapse of time. This study, acknowledged to be incomplete, is based upon the generally known incidents of the war, published reports and other sources of information, and makes no claim to greater authenticity than is shown on its face. Motives and reasons are deduced from known actions, which, after all, is a very logical method. Whether or not the motive inferred in any particular case was in fact the real motive, it may still serve to point its moral quite as effectively, provided that reasonableness is always maintained.

Of all the elements that enter into maritime warfare, strategy is probably the least apparent to the casual observer. It covers the whole possible field of operations, taking hostilities into one area and removing them from another; it works in silence and without ostentation, and prior to the actual clash of the opposing forces. One sees the results of strategy, perhaps in a brilliant victory, or possibly in the very absence of an engagement, but the unobtrusive strategy itself is often overshadowed by the more spectacular features that appeal with greater force to the popular fancy. It is well for naval officers that wish to reach the highest degree of proficiency in the science of maritime war, to read naval history with a discerning mind, in order that *all* the elements

of success may be discovered if possible, and surely strategy is not the least of these.

Naval strategy may be divided, more or less imperfectly, into two classes, peace strategy (or political strategy, if one prefers that designation) and war strategy. Peace strategy concerns itself with preparing the way for war strategy. It has to do more with naval bases, and the protecting or improving of lines of communication, than with the fleet itself, and is most intimately related to international relations, as well of one's own nation as of the other great nations of the world. Thus, from a naval standpoint, the building of the Panama Canal is a gigantic stroke of peace strategy, as it so materially shortens the route from one of our coasts to the other, thus facilitating the concentration of the fleet on either coast, and the transferring of the fleet from one ocean to the other. So also the building of a naval base at Pearl Harbor is peace strategy, since it advances our base to be used in a possible war in the Pacific. War strategy, on the other hand, concerns itself with the disposition, security and coordination of the various parts of the fleet during and in anticipation of hostilities.

We will take up in turn the peace strategy of Russia and of Japan, and then the war strategy of each, dividing the war strategy into its two logical phases, viz., (1) from the beginning of hostilities until the fall of Port Arthur, and (2) from the sailing of the Baltic fleet to the battle of Tsushima.

After the peace of Shimonoseki between Japan and China in 1895, events showed clearly that henceforth it would not be China, but Russia, with whom Japan would have to contend for the supremacy of the Far East. Japan, stung with mortification and bitter disappointment by the coalition of Russia, France and Germany, of which Russia was the leader, bided her time, and began systematically to prepare for war with Russia, which she saw the conflict of national interests would precipitate.

Let us trace from this time the more important steps of Japan and Russia that had an influence on the maritime war when it came, taking up first the Russian side.

At this time the only naval port in eastern Asia held by Russia was Vladivostok, as yet unconnected by rail with Russia proper. The first step taken by Russia of interest to us came soon after the signing of the treaty of Shimonoseki. Taking advantage

of her predominant influence over the Tsung-li-yamen, Russia obtained permission to continue her Siberian railway from Transbaikal straight to Vladivostok across Chinese territory (Manchuria). By this concession her only east-Asian naval port was brought about 330 miles nearer Russia, and incidentally the cost of the railway was much reduced and Russia gained a foothold in Manchuria that she has held to this day. However, Russia had ambitions beyond Vladivostok, for there were two serious naval objections to this port. It was not ice free, and Japan completely covered its approaches by sea, and, in any case, an alternative base was desired. So Russia turned her attention towards the Yellow Sea. In 1898 she acquired, by what was termed a lease, the southern portion of Liao-tung Peninsula, covering Port Arthur and Ta-lien-wan Bay, the very concession that she had kept from Japan in 1895. By connecting Port Arthur with her railway line in the north, she had a naval port practically ice free, clear of the Sea of Japan, and in railway communication with Russia.

Observe the locations of the two Russian naval bases in relation to Corea, the objective, one on each flank. (See chart.) Unfortunately for Russia, however, Japan had the *central* location, and Russia's next move was an attempt to nullify this, and for boldness and effrontery exceeded anything she had yet attempted. It was nothing less than the obtaining from Corea of permission to establish a naval base at Masampo, located, one might say, in Japan's front yard. A glance at the chart is all that one needs to realize the vast importance to Russia of this move, had not Japan been able to prevent its successful termination through her influence at the Corean court. After this failure Russia contented herself with fortifying, strengthening and developing Vladivostok and Port Arthur, and generally in making more secure her position in the Far East. Where she most signally failed was in her lack of actual preparation for the inevitable conflict itself, and in her failure to recognize the paramount importance of naval power when the actual clash came.

During these years Japan had not been idle. After the peace of Shimonoseki, she turned her attention to improving her financial condition, and to assimilating that which she had learned in the China-Japan War by reorganizing and increasing her naval and military forces. It was realized that in preparing for war

no element of possible national weakness should be left unstrengthened. Particular attention was paid to developing and extending her naval bases on and near the Corean Strait, and a new base was established at Takeshiki on the Island of Tsushima.

In 1902 Japan executed through diplomacy a stroke of peace strategy of far-reaching importance. By concluding an alliance with England, the possibility of interference by other nations while Japan was at war with Russia was virtually eliminated. Japan had learned well the lesson of the coalition after the treaty of Shimonoseki, and did not propose to be deprived again of the most substantial fruits of victory. After the conclusion of this alliance, Japan's diplomacy with Russia underwent a radical change. Where she had acquiesced and ignored before, she now formulated demands. All the world, with the possible exception of Russia herself, realized that the result must be war, unless Russia made a decided change of front.

Of greater importance than all other peace strategy was the careful and systematic preparation by Japan of complete, elaborate and detailed plans for the execution of the war, and it behooves the belligerent of the future to learn this lesson well.

It may occur to some, in a body of readers composed largely of naval officers, that what is here included under the head of peace strategy, while possibly of interest to the student of history, is of only academic interest to those of the naval profession. However, naval officers must not overlook their duty in influencing, as may be in their power, both politics and diplomacy where they affect the preparedness for war of the navy. At times the way may seem long, and their influence *nil*, but their *duty* remains the same. For years the influence of the navy was thrown towards the establishment of the imperatively needed naval base at Pearl Harbor, and for years Congress refused to sanction it. The navy, figuratively speaking, sat upon the doorstep of Congress and yelled until Congress had to listen, and the desired legislation was at last forthcoming. The influence of the navy upon public opinion touching naval matters is much greater than many naval officers suppose, and professional service opinion must ever be ready to point the way, or sound the cry of warning as may be necessary, to the unprofessional opinion on naval affairs. One does not become less of a citizen by virtue of a commission in the navy, but rather his obligations as a citizen are increased.

Let us now take up the consideration of the war strategy of the two belligerents from the outbreak of hostilities to the elimination of the Russian Port Arthur fleet.

It is impossible to explain satisfactorily Russia's lack of realization that war was imminent early in 1904. It must be true that she *did* fail to realize this, however, for in no other way can one account for her poor naval strategy. The outbreak of hostilities found the Russian naval forces in Asia located as follows:

At Port Arthur, 7 battleships, 1 armored cruiser, 7 cruisers, 4 gunboats and 14 destroyers.

At Vladivostok, 3 armored cruisers and 1 protected cruiser.

At Chemulpo, 2 cruisers.

And several gunboats at different Chinese ports.

At Suez, on their way to the Far East, there were 1 battleship, 2 armored cruisers and 2 cruisers. These turned back and took no part in the first phase of the war. The woeful inadequacy of these reinforcements for the Far Eastern fleet, even had they been despatched in proper season, is but one of many indications of the poor strategy of Russia.

At this day, when we so fully realize the military importance of concentration, it would seem almost idle to call attention to the glaring error of the Russians in failing to concentrate all their available naval forces, but, less we be tempted to point the finger of scorn, it must not be forgotten that at the outbreak of hostilities in 1898 we were caught with 25 per cent of our first-class battleships (the *Oregon*) in the Straits of Magellan, and that very recently our Senate has recommended to the President that our battleships be divided between the Atlantic and the Pacific Oceans.

In marked contrast to their enemy, the Japanese naval forces were all concentrated at, or near, Sasebo, the two cruisers bought in Italy not yet having arrived. In October, 1903, five months before hostilities began, a foreign naval attaché in Tokio, in a conversation with the Vice-Chief of the Navy General Staff, remarked, "You must be very busy," to which he replied, "Quite the contrary. We have nothing to do. We are all ready and only await orders." Comments or comparisons in regard to such a condition would be superfluous.

Before we take up any of the operations of the war it may be well to point out that the Japanese understood perfectly the value

of the command of the sea, while the Russians apparently had no conception of its influence, certainly not until late in the war. This attitude on the part of the Russians explains many things that otherwise would be incapable of explanation. A few citations are all that are needed to illustrate the Russian point of view. Captain Klado, in his "The Battle of the Sea of Japan," says that he heard General Kuropatkin say on several occasions that not only the Russian Navy but also navies in general were of very little utility. Kuropatkin was at that time Minister of War, and later, as Commander-in-Chief in Asia, he had command of all the Russian forces, naval as well as military.

Klado also says that the command of the sea was still held in derision by both the Ministry of Marine and of War even after the disasters on land. It would be interesting to know what the opinion of General Kuropatkin was then, when in the field he saw the armies of his enemy being supplied and reinforced by the over-sea route with security, promptness and dispatch.

What, in general terms, were the problems of Japan and of Russia? Japan went to war because she considered Russia's attitude and position in Manchuria and northern Corea to be a menace to Japanese vital interests. Therefore, the Japanese problem was to effect by force of arms a change in the Russian status; the Russian problem was simply to maintain herself *in statu quo*. Japan, to succeed, must first get her military forces to the continent and then defeat the Russian land forces. Conversely, Russia must keep the Japanese forces from the mainland, or, failing in that, defeat them after they got there.

Let us now look at the chart of Japan and Eastern Asia. If, from the southern point of Liao-tung Peninsula, a line be drawn tangent to the western end of Quelpart Island, and a line parallel to this de drawn through Shimonoseki Strait, in the area included between these lines we have the area of paramount strategical importance in this war. Here took place all of the naval operations of moment. These operations did not give to the area in question its importance, but its importance *caused the operations to take place within its limits.* This distinction must be understood, for the importance of the area was inherent from the very problem that the war undertook to settle.

This area, in its relation to the war we are considering, may be compared to a bridge spanning a broad and deep river in the

area of military operations of some land war. The general that controls such a bridge can move his troops over the river at will, and at the same time deny its use to the opposing general, forcing him, in case he wishes to cross, to make a wide detour, and probably subjecting his force to much delay, inconvenience and danger. Now, when this bridge is in the most direct and secure route from one of the generals to his main objective, its value to each of the combatants is all the more enhanced. Such was the case of the maritime bridge under consideration. One of the combatants in this case (Japan), by the very nature of her problem, had to enter the country at the far end of this maritime bridge. To do so with any hope of success, she must control, at least to a large extent, the route over which supplies and reinforcements must come, even though she might actually land her army without such control, or with very temporary control. Thus we see that if Japan could control this direct route her line of communications with her army that must be sent to the mainland was assured, and she could undertake land operations that if successful would terminate the war. If, on the other hand, Russia could control it, Japan must find another line, or else fail in her object of bringing Russia to terms in Manchuria. No line was practicable for Japan north of Gensan, owing to the difficult nature of the country bordering the Sea of Japan on the west and the absence of ports, and the line via Gensan would have been much more difficult than one along the west coast of Corea. It follows that the control of the area in question was almost a necessity to Japan's success, as enabling her to undertake an offensive campaign, while it was of equal importance to Russia in defense. Japan realized this, and prior to hostilities subjected the area to the closest study through her naval and military general staff and prepared comprehensive and complete plans for its control that were now to be put to the test.

The naval part of the war was fought for the control of this small area of the sea that formed the vital connecting link between Japan, Corea and Manchuria. The belligerent that succeeded in getting and maintaining control of this area would have in his grasp the key to ultimate victory.

When Japan decided that the time for war had arrived she *at once* began a comprehensive naval campaign for command of the sea within the strategic area above outlined, while Russia,

taken unawares and apparently without plan or naval preparation, did nothing. As Admiral Togo began his first report, "The combined fleet left Sasebo on the 6th and proceeded as had been previously settled." The words "as has been previously settled" occur repeatedly in Admiral Togo's despatches throughout the war, and they throw a flood of light upon the forehandedness of the Japanese Navy General Staff. One would not think of venturing upon extensive business operations without first preparing comprehensive plans, and yet how often does one see war operations undertaken in complete violation of this fundamental principle. The Japanese fleet remained combined only in so far as its parts were all working on interior lines and towards one end—the command of the sea in the area covering Japan's main line of future communications. Vice-Admiral Kamimura, with one or two armored cruisers and several smaller cruisers, took station in the Corean Strait to keep the Vladivostok division from coming through; Rear-Admiral Uriu with one armored cruiser and several cruisers and destroyers went to Chemulpo to destroy the Russian ships there; Vice-Admiral Togo, with the main fighting force and destroyers, went for the chief objective, the Russian battle fleet at Port Arthur.

It is well to notice here that the division of the Japanese naval forces was more apparent than real, since all of the Japanese detachments were between the two main Russian detachments. All of the Japanese force could be brought against either of the Russian detachments before the other Russian detachment could join. In other words, strategically speaking, the Japanese forces were still concentrated and between the two Russian detachments. Every Japanese part was operating on interior lines to the Russian forces.

Advanced bases were promptly established at Gensan, at Masampho, off Mokpo in Najan Islands, in Hai-ju Bay, off Chinnam-po, at the mouth of the Ta-tong River, and in the Elliott Islands.

Note the complete chain of bases from Japan to the seat of land war, extending up the middle of the strategic area previously mentioned. Gensan alone is outside of this area. This base was established, no doubt, for two reasons, to keep it out of the hands of Russia and to have it available for an alternative line of communication if needed.

Thus, from the very beginning of the war, Japan had command of the sea where most needed, i. e., from the Straits of Corea to Liao-tung Peninsula. Her transports and supply ships, without convoy, passed practically unmolested from her home ports to the seat of war, and her small gunboats operated with the army on the west coast of Corea unimpeded by the Russian naval forces.

Of the numerous gun and torpedo attacks made by the Japanese on the Russian fleet at Port Arthur, it is unnecessary to speak in detail in a strategical study. From the way Togo avoided endangering his battleships, and from his repeated attempts to block the entrance to Port Arthur, it is perfectly apparent that he hoped to eliminate the Russian fleet in Port Arthur by the capture of the place by the land forces, in conjunction with the naval blockade. The increasing importance of command of the sea as the war progressed was realized. Togo's battle fleet was the only force available for this purpose when Russian reinforcements arrived, and it was impossible to replace this fleet during the continuation of the war. Throughout the war the Japanese kept in view the *whole* war rather than any particular feature or phase of the war. They cared little for spectacular victories of small importance, but were concerned only with ultimate success.

When the Russian fleet made its sortie from Port Arthur on August 10, it must have been apparent to those in authority that its further usefulness at Port Arthur had absolutely ceased, even if it had ever had any usefulness there. Yet, after a very indecisive action, the major portion of the fleet returned to Port Arthur, to sink later at their moorings from Japanese fire from shore or at the hands of the Russians themselves. It was the imperative duty of this fleet, placed as it then was, to engage the Japanese fleet in a decisive action, *even to their own complete annihilation,* in the hope of so damaging the Japanese fleet as to make easier the regaining of the lost command of the sea by the Baltic fleet upon its arrival. They were as ignorant of major as of minor strategy, and seem to have been animated by no more lofty ideas than *sauve qui peut.* It has been stated that the Russian Admiral said that he was going to Vladivostok in case he could do so without fighting. In war, what is worth having is worth fighting for, and at sea or on land the leader that expects to accomplish great things without fighting is predoomed to defeat.

A fleet that will not fight to attain its objective has no further

interest for us, so let us turn our attention to the cruiser division at Vladivostok and see if, perchance, it did anything of interest. The authority directing this division seems to have had the idea that it could accomplish something, but just what that something was must have been vague and ill defined. The division in question made a number of raids in the Sea of Japan, in one instance even getting well down in the Straits of Corea, and in another instance passing out of the Sea of Japan through Tsugaru Strait and cruising down the east coast of Japan as far as the entrance to Tokio Bay. The object of these raids, if they had a military object, must have been to draw some of the Japanese ships out of the Yellow Sea. In this they were unsuccessful. The Japanese never for a moment lost sight of the correct objective, the battle fleet in being of their enemy. However unpleasant these raids might be to the Japanese, they could have no effect on the outcome of the war, so long as Togo's fleet contained the Russian fleet at Port Arthur. It may be well to consider here for comparison our conduct during the Spanish-American War every time an over-excited fisherman reported a school of porpoises as a Spanish fleet.

There remains but one other incident to consider in this phase of the war, and that is the action of August 14 between Vice-Admiral Kamimura's division and the Vladivostok division. Kamimura has been severely criticized in some foreign countries for abandoning the chase after sinking the *Rurik*. If this action be viewed as an isolated naval battle, the criticism is assuredly justified, but we must look at it as only one small incident in the whole war, and then Kamimura's conduct seems both strategically correct and highly commendable, for he sacrificed the completeness of an unimportant action in which he personally took part to the possible good of the Japanese position as a whole. Let us briefly inspect the whole scene of naval operations at this time. On August 10 the Port Arthur fleet made its sortie, and one battleship, the *Czarevitch*, eluded the Japanese, and Kamimura did not know how many others had done the same. A Russian destroyer escaped to Chefoo and undoubtedly got a message through to Vladivostok, for 12 hours later the Vladivostok division headed for the Straits of Corea to join the Port Arthur fleet.

Now the duty of Kamimura was perfectly clear. He must keep the Vladivostok cruisers from passing through the Straits of

Corea to the southward, and he must, above all things, keep any Russian battleships from passing to the northward. At daylight on August 14 he located the enemy's cruiser division about 30 miles north of Tsushima. The Russian cruisers turned north and the Japanese gave chase for five hours. Just how far this took them from the Straits of Corea, we do not know. Anyway, at this point, having sunk the *Rurik*, Kamimura abandoned the chase and headed for his station, and by the time he reached it his ships must have been away as much as eight hours. He had accomplished the first part of his duty and he took no great chances of failing in the second. The fact that the *Czarevitch* disarmed at Kao-chow rather than attempt to go on to Vladivostock does not make Kamimura's judgment less correct.

One of the famous expressions of Nelson was, "Had ten ships been taken and the eleventh escaped, we being able to get at her, I should never consider it well done." At first sight Admiral Kamimura's conduct might seem a violation of the principle contained in this phrase, but Nelson used it specifically in relation to the battle fleet of the enemy. Kamimura turned back to prevent the possible escape of the *one battleship*, and it must be acknowledged that to prevent one battleship from getting through the straits was of far greater ultimate importance than to destroy the two remaining cruisers. Certain it is that the two cruisers that escaped had no subsequent influence on the war, and the information was given out in Tokio that Kamimura acted according to his orders. He sacrificed sentiment to good strategy, which was consistently done by the Japanese during the whole war.

Having seen what *was* done by the two combatants during the first phase of the war, let us briefly see what *might have been done* had Russia realized two things: the iminence of war and the paramount importance of command of the sea. What was the problem confronting the Russian Naval General Staff? It was, first, to determine the objectives of Japan, and, second, to determine where to concentrate their fleet and how to use it so as best to prevent Japan from attaining her objectives.

Japan had no hope of bringing Russia to terms without defeating the Russian land forces in East Asia. In order to have a secure line of communications for her army Japan must get and maintain command of the sea within the necessary area. Therefore, her first objective must be the Russian fleet, but only as a

means to an end, the end being the occupation of Corea, and the defeat of the Russian army in the Liao-tung Peninsula and in Manchuria. Before Russia decided upon the port for naval concentration she should have decided whether her force available was strong enough to conduct an aggressive, offensive campaign, or whether a defensive campaign was necessary until her naval forces could be reinforced. She apparently decided the latter, and subsequent events seem to have borne out the correctness of the decision. At which end of the line then should she have placed her fleet, at Port Arthur or Vladivostok? Japan, in any case, must make her advance into Manchuria from the south, owing to the distribution of the Russian forces in and around northern Corea, the nature of the country, and the protection that would be afforded her over-sea line of communications by a chain of temporary bases; whereas she was prevented from making her advance from the east by the mountainous country practically devoid of roads and without ports of consequence from Gensan to Vladivostok for landing or for temporary bases. The Russian army in the Liao-tung Peninsula must at least be contained, if not seriously engaged, soon after the Japanese army crossed the Yalu in their advance. Of what advantage then to Russia to conduct a *defensive* naval campaign from Port Arthur? The presence there of the fleet but made it a double objective, since the fall of the port would eliminate both army and fleet.

Let us look at the port at the other end of the line, Vladivostok. Not unlike Port Arthur, it is located on a small peninsula, on a land-locked harbor, but a harbor of greater extent and facility of ingress and egress for large ships. Its approaches, both from seaward and from the interior, are much more favorable for defense. On one side of the peninsular lies Usuri Bay, on the other Amur Bay, and extending about 25 miles in a southwest direction from Vladivostok and separating the two bays is a chain of islands with numerous passages between them. The land in the immediate and more remote vicinity is very hilly and rugged, and numbers of batteries cover all approaches by land as well as by water. In the opinion of military experts the reduction of Vladivostok would have presented quite as many difficulties as did the reduction of Port Arthur, while from seaward it is not nearly so easy to blockade. The Japanese never attempted to blockade Vladivostok during the war, considering it easier to

keep the cruisers *out* of the Corean Straits than to keep them *in* Vladivostok Harbor. The Japanese Navy Department stated during the war that it was thought that naval operations off Vladivostok were *practically impossible,* owing to the prevalence of dense fog. It would be hard to overestimate the vast difficulty for Japan had she been forced to send an army to operate against Vladivostok with its bleak and rugged country, and with the Russian fleet ineffectively blockaded, and this in *addition* to her other enterprises, for they would still have been necessary.

The question of ice at Vladivostok had to be considered, but Russia had ice breakers there for the very purpose of keeping the port open to the navy, and, as a matter of fact, we know that the cruisers started on their first raid from Vladivostok on February 9th. The danger from ice would have been far greater for the blockaders than for the blockaded, particularly in a defensive campaign.

Had Russia based her fleet on Vladivostok and hastened reinforcements to them, the question of the ultimate command of the sea might have resulted far differently from what it did, though, of course, other elements might have nullified the best strategy.

It would seem then that Vladivostok was the better port from which to conduct a *defensive* campaign, as offering the greater facilities for retarding the Japanese operations until naval reinforcements could arrive from Russia. Had Russia been able to conduct an *offensive* naval campaign from the beginning, it seems that Port Arthur would have been the proper base from which to operate, being so favorably located on the flank of the Japanese main line of communication. Thus we see that in choosing a strategic point we have to consider not only the situation, strength and resources of the point, but also the nature of the campaign to be undertaken.

The importance of the strategic area mentioned previously is not overlooked, but is emphasized. There is a place, a time and a method for obtaining control and it is the function of strategy to co-ordinate these for ultimate success. After the defensive campaign had been conducted from Vladivostok and *reinforcements had arrived,* then an offensive campaign must have been undertaken for command of the sea within the area, when it could have been undertaken with much greater prospect of success.

As indicative of the Japanese opinion in regard to the location of the Russian fleet is a statement in a publication on the Russo-Japanese War by the British Army General Staff, and we know that the British had unexcelled opportunities for acquiring information. In discussing the commencement of hostilities, this statement occurs: "On the 3d of February, ... a report reached Tokio that the Russian squadron at Port Arthur had put to sea. For a brief space something akin to consternation filled the breasts of the Japanese, ... but the alarm . . . . quickly subsided when it was known that the Russian admiral had anchored his command in the outer roadstead of Port Arthur." It would seem as though the Japanese wanted the Russians to remain at Port Arthur, and we know that the Japanese were not influenced by sentimental reasons.

It may be well to digress here for a moment to point out the reasons for dwelling upon the difference in strategy necessary if a continuous offensive campaign be undertaken, or if at first the defensive be assumed in order that later an offensive campaign may be entered into with greater chances of ultimate success.

The position of the United States in relation to the Pacific is somewhat analogous to that of Russia at the beginning of 1904. Each fronts on two seas far remote from one another. On account of many practical considerations, our naval force is divided between the Atlantic and the Pacific, as Russia's fleet was divided between the Pacific and the Baltic. As Russia habitually kept the greater part of her naval forces in the Baltic, we keep ours in the Atlantic, and it is improbable that during peace the general distribution of our forces will materially change. Russia and the United States are both nations of great power and resources, but the United States particularly is strong in latent military force, while in a chronic state of unpreparedness for war. If, unfortunately, at some future time we should become engaged in war with a nation in the Pacific, and, as is probable, our naval force is divided between the Atlantic and Pacific, sound military policy would dictate that at first we adopt a defensive attitude, until complete concentration has been effected. However humiliating it may be to a first-class power, and however insistent public clamor may be, we cannot afford to fritter away our power, but must wait until our whole available force is concentrated with respect to the campaign to be undertaken, and then assume the

aggressive-offensive by hurling our massed military power against the enemy in an effort to deal a paralyzing blow from which it will take him years to recover.

This must not in any way be taken as an argument favoring the *defensive* method of war as against the *offensive*. It would be much better to be in a position at the beginning of a war to at once assume the offensive, but, if, through poor strategy, the fleet at the outbreak of hostilities is not concentrated, it would be inexcusable to commit the further strategical error of exposing it to the enemy in detail, when by assuming for a time the defensive the previous error might, at least in part, be atoned for by concentration. The offensive method is usually preferable as offering the greatest chances of success, but in order that it may have the greatest number of factors in its favor, it is quite necessary in some cases, as the one under consideration, to assume the defensive for a time. One must not be so obsessed with the idea of the offensive as to think that it means the exposing of one's forces to attack merely as they come to hand; nor must one conceive the correct defensive as simply a passive waiting in the hope that something favorable may develop. The defensive is properly assumed when by delaying the campaign the defender adds some specific and definite power that enables him to then assume the offensive with greater chances of success.

This brings us to the end of our brief review of the strategy of the first phase of the naval part of the war. The Russian naval force in the Far East had been destroyed and Japan had lost one battleship by a mine. Japan had complete command of the sea in the area of hostilities, though Russia still had in other parts of the world a navy *numerically* superior to that of Japan. In the second and last phase of the war, Russia attempted to wrest command of the sea from Japan, in which she signally failed. Russia had to undertake now with the remnant of her naval forces what she should have undertaken with her whole naval force earlier in the war.

A great amount of discussion was had in Russia as to whether this attempt should be made, but this is of interest only as indicating the woeful lack of realization in Russia of the importance of command of the sea in the area of hostilities. That Russia delayed so long in despatching the Baltic fleet to the Far East, and the whole fleet at that, must ever remain as great a disgrace to

Russia in the eyes of naval officers as will the defeat of that fleet when it finally arrived.

As soon as the Japanese battle fleet was released by the fall of Port Arthur, active preparations to meet the Baltic fleet were begun. Her ships were cleaned and repaired, and then disappeared from public view. No vestige of information concerning them was allowed to become public. Japan's strategy of absolute secrecy at every stage of the war cannot be too highly commended, and may well be considered by us, belonging as we do to a press-ridden country, always clamoring for the publication of military information however valuable to an enemy it may be.

About this time Japan took a step that, so far as records show, has never been taken by any other belligerent. By public notice certain so-called "strategical sea areas" were set aside and placed under most stringent regulations as far as the entry of any except Japanese Government ships were concerned, and even fishermen might be excluded if thought necessary. The "areas" were the waters within 3 miles of the Hoko Group (Pescadores), Kelung, Okinawa Island, Amami O Shima Island and Tsugaru Strait. (See chart.) None of these "areas" are near the Straits of Corea, it must be observed. Other means were employed to keep military information concerning this region from becoming public, and, being more central in respect to the "*rayon d'action*," it had been since the beginning of hostilities a "strategical sea area," as were several other centrally located places.

Thus the Japanese weaved their web, and Togo's fleet retired unobserved into his lair in the Corean Straits at Masampho and Shikeshima, and patiently awaited in secrecy and assurance the coming of its victim, Rozhestvensky.

Meanwhile the Russian fleet had been slowly working its way eastward, threatened by nothing more dangerous than imaginary hostile cruisers, destroyers, submarines and war balloons, which appear to have been sighted with alarming frequency throughout the voyage, beginning on the Dogger Bank. About 50 miles north of Saigon, Rozhestvensky's fleet was completed by the arrival of Nebogatoff's division on April 9, and soon thereafter the combined fleet headed to the northward.

How different would have been the undertaking of Rozhestvensky had the eastern fleet concentrated at Vladivostok before the beginning of war. In all probability this fleet would still

have been in being instead of resting in the mud, interned, or in the hands of the Japanese. Had this fleet been in Vladivostok as Rozhestvensky drew near the region of hostilities, the problem would have been a grave one indeed for the Japanese. They would most likely not have captured Port Arthur before this, except for the alluring bait that the fleet there constituted. If they blockaded Vladivostok, their whole line of communications in the south were left exposed to Rozhestvensky, and Port Arthur was available as a much-needed base. On the other hand, if they attempted to cover the approaches to the Yellow Sea, the Vladivostok fleet was left free to proceed to a pre-determined rendezvous with the Baltic fleet, and Togo would then have had to meet the combined Russian fleet instead of meeting it in detail, as he did do. In any case the Japanese command of the sea would have been in jeopardy, if, indeed, it had not passed into the hands of the Russians. Picture the Japanese army cut off in Manchuria by the Russian fleet, as was the French army in Egypt by the British fleet commanded by Nelson. Alas, for Russia, only vain regrets! The foresight that is the *sine qua non* of strategy was lacking, and the fleets of Russia were largely defeated ere the war began by the poor strategy emanating in St. Petersburg.

Of Rozhestvensky's reasons for his method of procedure we know nothing. We can only infer from what we know of the then existing conditions. He was in command of a fleet apparently superior to the fleet of his enemy. The only hope of Russia in the war was for him to accomplish that for which he had been sent to the Far East, i. e., to gain command of the sea. He could only do this by destroying the Japanese battle fleet. The day for delay had passed; the day for action had arrived, and delay could avail nothing. He must fight, and fight with the full knowledge that in his hands was Russia's last hope. Between him and his only port, Vladivostok, lay Japan, the country of his enemy. The Japanese fleet had disappeared, whether into one of the so-called "strategical sea areas" or not he had no way of knowing. He not only did not know *what* was in these areas; he did not know whether *anything* was in them. Between Kelung and Okinawa Island was a distance of about 350 miles apparently clear of danger, whether left open by Japan intentionally or not we do not know. Through this opening he entered the Eastern Sea. He was in the spider's web.

About this time a zealous foreign naval attaché in Tokio asked at the Japanese Navy Department for the disposition of their fleet. He was informed that the direction of the Japanese fleet was wholly in the hands of Admiral Togo, and that only in the most extreme emergency would the department interfere. The *plan* of action had no doubt been decided upon by the Naval General Staff, but the *execution* of the plan was left in the hands of the commander-in-chief, where it belonged. Responsibility and authority went hand in hand.

In the Chusan Archipelago Rozhestvensky stopped long enough to coal for the last time. Why did he not separate his auxiliaries from his battle fleet after this? And why did he so overload his ships with coal? are the questions so frequently asked. The reason he did not do so was undoubtedly due to a particular attitude of mind induced by the special problem he had been so long engaged upon, i. e., the physical transferrence of a big fleet from the Baltic to the Far East during war. That this was a stupendous task, and that it was well done, none can deny. It was a question of ways and means, repairs, supplies, coal and anchorages. For months all of his energies had been directed towards the purely material side of the campaign, and the frame of mind that was induced caused him to see only the fact of getting his fleet to the Far East. The reason for doing this was lost sight of in the method of doing it. Thus, even at Chusan, though in the theater of hostilities, Rozhestvensky overloaded his ships with coal and continued his voyage accompanied by his auxiliaries, losing sight of the military handicap to which he was subjecting himself and possessed only with the idea of not getting caught without those cruising supplies that for so long had been his care. Thus lumbered and lumbering he laid his course for the Straits of Corea.

All the *entrances* to the Eastern Sea the Japanese had left unguarded, but the *exit* was covered by Japanese scouts to give timely warning, and was defended by the concentrated sea power of Japan. The result is too well known to need mentioning. Russia, by failing to learn from history the value of real sea power, and by failing to learn how to handle even such forces as were available, had to pay for her ignorance in bitter defeat. With the destruction of Russia's fleet, the last hope of victory for her in the war passed away. Once again had sea-power exerted its influence upon history.

In our brief survey of the main incidents of the war we find no *new* principles of naval strategy demonstrated. The value of a study of the strategy employed is that it affords an additional, and the most recent, illustration to be added to the many already to be found in naval history, tending to show the correctness of certain strategical principles and the fallacy of certain others. Throughout the war we see on the part of one belligerent, and the opposite on the part of the other:

1. Careful preparation for war in time of peace, including plans as well as forces.

2. A view of the war as a whole rather than as a series of independent parts.

3. Concentration with a view to the particular campaigns to be undertaken.

4. Secrecy regarding all military matters.

5. No sacrifice of military principle to sentiment or public clamor.

6. The least possible division of authority.

7. Well selected and protected lines of communication.

8. Bases selected with a view to interior lines.

9. Complete realization of the paramount importance of command of the sea, particularly in certain areas.

10. The careful husbanding of non-replacable forces.

11. Recognition of the threat to the command of the sea that always exists so long as the battle fleet of the enemy remains in being.

The reasons for the success of Japan and the failure of Russia are not secrets. The principles observed by one and disregarded by the other may be found set forth in naval history repeatedly since men first fought for the mastery of the sea. Their observance is associated with victory, and their non-observance with defeat. History with impartiality records the good and the bad, and it is quite as important for the student of warfare to reject the bad as it is to accept the good. It is only in time of peace that one's mind may be so trained by the study of correct principles that in time of war the *proper* solution of special cases will seem only the *obvious* solution, as dormant memories spring forth as inspirations. Reading, study and thought during peace have been cited again and again by the great captains of the world, both naval and military, as the source of their inspiration in war. Such a source is open to all.

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THE REAL STATUS OF THE PANAMA CANAL AS REGARDS NEUTRALIZATION.

By CAPTAIN H. S. KNAPP, U. S. Navy.

[PREFATORY NOTE.—All but the fifth section of this paper was written about three and one-half years ago; that section was written about a year later. The whole is here printed substantially in its original form, and with no changes that affect the sense. In the *American Journal of International Law* for April, 1909, a distinguished retired officer of the Army published a paper on the same general subject in which conclusions are reached quite the contrary of those herein maintained. It seems worth while to present the opposite view-point to his in order that readers may have both before them, and form their own conclusions on a matter of wide interest to the nation, and particularly to the military services. In addition to the standing notice it seems proper to emphasize the fact that the writer speaks for himself alone in the following pages.]

I.

Preceding any intelligent discussion of the status of the Panama Canal regarding freedom of passage and inviolability in war, which have so generally and so loosely been spoken of as "neutralization" even in official documents of the latest date, it will be necessary first to examine the treaty obligations of the United States under which the Canal is now under construction, and which define the powers of control over it when it shall be finished.

The latest of these is the convention concluded November 18, 1903, by the late John Hay and Mr. Bunau-Varilla, Envoy Extraordinary and Minister Plenipotentiary of the Republic of Panama. This convention was proclaimed on February 26, 1904, after due ratifications, its title being "Convention for the Construction of a Ship Canal."[1]

[1] Compilation of Treaties in Force, 1904, p. 609.

Article I guarantees the independence of Panama by the United States.

In Article II Panama

grants to the United States in perpetuity the use, occupation and control of a zone of land and land under water for the construction, maintenance, operation, sanitation and protection of said Canal.

The width of the zone is ten miles, and it does not include the cities and harbors of Panama and Colon, but does include the small islands in the former harbor called Perico, Naos, Culebra and Flamenco. The article further grants

in perpetuity the use, occupation and control of any other lands and waters outside of the zone above described which may be necessary and convenient for the construction, maintenance, operation, sanitation and protection of the said Canal or of any auxiliary canals or other works necessary and convenient for the construction, maintenance, operation, sanitation and protection of the said enterprise.

In Article III

The Republic of Panama grants to the United States all the rights, power and authority

within the zone and auxiliary lands and waters mentioned in Article II,

which the United States would possess and exercise if it were the sovereign of the territory within which said lands and waters are located to the entire exclusion of the exercise by the Republic of Panama of any such sovereign rights, power or authority.

It is interesting to note the peculiar wording of these two articles, in which Panama does not grant the territory, nor relinquish her sovereignty over it, but grants its "use, occupation and control" and relinquishes the "exercise . . . . of sovereign rights, power or authority" therein.

In Article IV Panama

grants in perpetuity to the United States the right to use the rivers, streams, lakes and other bodies of water within its limits for navigation, the supply of water or water power or other purposes

as far as may be

necessary and convenient for the construction . . . . and protection of the said Canal.

The words "its limits" above refer to the Republic of Panama and not to the Canal zone alone.

In Article V Panama

> grants to the United States in perpetuity a monopoly for the construction, maintenance and operation of any system of communication by means of canal or railroad across its territory between the Caribbean Sea and the Pacific Ocean.

Article VII grants to the United States the exercise, under certain circumstances, of the right of eminent domain in the cities of Panama and Colon; and the right also to enforce sanitary measures and maintain public order therein in case of necessity.

Article IX provides that the entrance ports to the canal and the waters thereof, together with the towns of Panama and Colon "shall be free for all time."

Article XIV provides for the initial compensation and, after nine years, the annual payment to be made by the United States to Panama for the rights, powers and privileges granted in this convention.

Article XVIII reads:

> The Canal, when constructed, and the entrances thereto shall be neutral in perpetuity, and shall be opened upon the terms provided for by Section I of Article three of, and in conformity with all the stipulations of, the treaty entered into by the Governments of the United States and Great Britain on November 18, 1901.

Article XX provides that Panama shall abrogate, or procure the abrogation of, any privileges or concessions in favor of the government or citizens of a third power relative to an interoceanic means of communication that are incompatible with the terms of this convention, and which may have descended to or been assumed by the Republic of Panama.

Article XXIII reads:

> If it should become necessary at any time to employ armed forces for the safety or protection of the Canal, or of the ships that make use of the same, or the railways and auxiliary works, the United States shall have the right, at all times and in its discretion, to use its police and its land and naval forces or to establish fortifications for these purposes.

Article XXV reads:

> For the better performance of the engagements of this convention and to the end of the efficient protection of the Canal and the preservation of its neutrality, the Government of the Republic of Panama will sell or lease to the United States lands adequate and necessary for naval or coaling stations on the Pacific coast and on the western Caribbean coast of the Republic at certain points to be agreed upon with the President of the United States.

The remaining articles need not be quoted for present purposes.

A consideration of the articles quoted shows that our government has:

(a) Monopoly of trans-Panama projects of communication.

(b) The engagement of Panama to ensure us that monopoly by abrogation of any privileges or concessions to the governments or citizens of any third power.

(c) Practical sovereignty over the Canal zone, excepting the cities and harbors of Colon and Panama, though no actual sovereignty is ceded in word and an annual rental is paid.

(d) Rights and privileges directly and repeatedly expressed regarding the protection of the Canal, including the right to use troops and fortify, and the acquisition of naval as well as coaling stations.

(e) To the maintenance of these objects, it guarantees the independence of Panama.

No plainer language is needed to indicate the determination of the United States to own, control and provide for the defense of the Canal, alone and unaided, in so far as this instrument makes it possible.

But it will be noted further that the United States engages, in Article XVIII, that "the Canal, when constructed, and the entrances thereto shall be neutral in perpetuity"; and again, in Article XXV, where lands for naval or coaling stations are provided for, the words

> to the end of the efficient protection of the Canal and the preservation of its neutrality

are used. The declaration of Article XVIII and the words quoted from Article XXV are of serious import, and the meaning to be ascribed to them must be determined by a consideration of the circumstances leading up to the conclusion of the convention, and of the announced policy of our government, as well as of the exact meaning of the words "neutrality" and "neutral" in the connection used above.

Article XVIII, besides declaring the Canal to be neutral, prescribes that the Canal

> shall be opened upon the terms provided for by Section I of Article three of, and in conformity with all the stipulations of, the treaty entered into by the Governments of the United States and Great Britain on November 18, 1901.

This leads to an examination of that instrument, which is entitled a "Treaty to Facilitate the Construction of a Ship Canal"[2] and was proclaimed February 22, 1902, after due ratifications. It is better known as the Hay-Pauncefote Treaty.

In making this examination it should be borne in mind that the Hay-Pauncefote Treaty is the culmination of many years' dissatisfaction in the United States with the provisions of the treaty concluded in 1850 between the same nations which is generally known as the Clayton-Bulwer Treaty. The latter will be examined later, the present object being to discover exactly what conventions exist to-day under which the United States has obtained rights and assumed duties.

The Hay-Pauncefote Treaty recites in the preamble that the High Contracting Parties

being desirous to facilitate the construction of a ship canal to connect the Atlantic and Pacific Oceans, by whatever route may be considered expedient, and to that end to remove any objection which may arise out of the Convention of the 19th April, 1850, commonly called the Clayton-Bulwer Treaty, to the construction of such canal under the auspices of the Government of the United States without impairing the "general principle" of neutralization established in Article VIII of that convention, have for that purpose appointed as their Plenipotentiaries, etc.

Article I reads:

The High Contracting Parties agree that the present treaty shall supersede the afore-mentioned Convention of the 19th April, 1850.

Article II reads:

It is agreed that the canal may be constructed under the auspices of the Government of the United States, either directly at its own cost, or by gift or loan of money to individuals or Corporations, or through subscription to or purchase of stock or shares, and that, subject to the provisions of the present Treaty, the said Government shall have and enjoy all the rights incident to such construction, as well as the exclusive right of providing for the regulation and management of the canal.

Article III reads:

The United States adopts, as the basis of the neutralization of such ship canal, the following Rules, substantially as embodied in the Convention of Constantinople, signed the 28th October, 1888, for the free navigation of the Suez Canal, that is to say:

1. The canal shall be free and open to the vessels of commerce and of war of all nations observing these Rules, on terms of entire equality, so that there shall be no discrimination against any such nation, or its citizens or

[2] Compilation of Treaties in Force, 1904, p. 380.

subjects, in respect of the conditions or charges of traffic, or otherwise. Such conditions and charges of traffic shall be just and equitable.

2. The canal shall never be blockaded, nor shall any right of war be exercised nor any act of hostility be committed within it. The United States, however, shall be at liberty to maintain such military police along the canal as may be necessary to protect it against lawlessness and disorder.

3. Vessels of war of a belligerent shall not revictual nor take any stores in the canal except so far as may be strictly necessary; and the transit of such vessels through the canal shall be effected with the least possible delay in accordance with the Regulations in force, and with only such intermission as may result from the necessities of the service.

Prizes shall be in all respects subject to the same Rules as vessels of war of the belligerents.

4. No belligerent shall embark or disembark troops, munitions of war, or warlike materials in the canal, except in case of accidental hindrance of the transit, and in such case the transit shall be resumed with all possible dispatch.

5. The provisions of this Article shall apply to waters adjacent to the canal, within 3 marine miles of either end. Vessels of war of a belligerent shall not remain in such waters longer than twenty-four hours at any one time, except in case of distress, and in such case, shall depart as soon as possible; but a vessel of war of one belligerent shall not depart within twenty-four hours from the departure of a vessel of war of the other belligerent.

6. The plant, establishments, buildings, and all work necessary to the construction, maintenance, and operation of the canal shall be deemed to be part thereof, for the purposes of this Treaty, and in time of war, as in time of peace, shall enjoy complete immunity from attack or injury by belligerents, and from acts calculated to impair their usefulness as part of the canal.

Article IV reads:

It is agreed that no change of territorial sovereignty or of the international relations of the country or countries traversed by the before-mentioned canal shall affect the general principle of neutralization or the obligation of the High Contracting Parties under the present Treaty.

Article V, which is the last, has the usual phraseology concerning ratification.

Article II is an evidence of the determination of the United States that its government should own the Canal if it seemed best, and control it under any circumstances, alone and unaided.

Article III sets forth certain Rules as the basis of the "neutralization" of the canal,

substantially as embodied in the Convention of Constantinope,[3] signed the 28th of October, 1888, for the free navigation of the Suez Canal.

[3] Senate Document No. 151, 56th Congress, 1st Session.

There are significant omissions, however. In Article I of the Constantinople Convention[4] it is declared:

> The Suez Maritime Canal shall *always* be free and open, *in time of war as in time of peace,* to every vessel of commerce or of war, without distinction of flag. *Consequently the High Contracting Parties agree not in any way to interfere with the free use of the Canal, in time of war as in time of peace.*[5]

Again Article IV of the Constantinople Convention, in expressing the agreement of the powers to refrain from acts of hostility and belligerent operations, or acts having obstruction of the Canal in view, uses these words:

> The Maritime Canal remaining open *in time of war* as a free passage, *even to the ships of war of belligerents . . . . even though the Ottoman Empire should be one of the belligerent Powers.*[6]

The words underlined are not to be found in the Hay-Pauncefote Treaty, nor any words that can be construed to have a like meaning. This is the more significant when it is recalled that Lord Pauncefote was one of the negotiators of the Convention of Constantinople. It is true that the reading of Rule 6 of the Hay-Pauncefote Treaty at first sight appears to have a provision to a similar effect in the words "and in time of war, as in time of peace, shall enjoy," etc. But that makes no mention of, nor can its language be inferred to mean, any obligation to keep the Canal open to an enemy of the United States. By Rules III and IV belligerents are not forbidden to use the Canal; indeed the language of the Rules assures that they may use it. The article opens with the words "The United States adopts . . . . "; but nowhere is the United States specifically mentioned as a belligerent, or included in definite words in any such manner as is the Ottoman Empire in the articles of the Constantinople Convention. Nor is any special definite authorization laid down that an enemy of the United States may use the Canal to the detriment of the latter's interests. However far the Rules go in allowing the use of the Canal to belligerents in a war where the United States is a neutral, they certainly do not specifically include a belligerent who is an enemy of the United States. In this respect they are radically different from the Rules agreed to by the powers signatory to the Constantinople Convention, and the internal evidence of their

[4] See Part IV of this paper.

[5] Italics the writer's.

[6] Italics the writer's.

wording is that they are adopted by the United States as the guide to its conduct in the treatment of belligerents in a war in which the United States itself is not engaged, and that only to that extent does the United States guarantee the "neutralization" of the Canal. Had the United States intended that the Canal should be free and open in war to its own enemies, it is certain that, with the provisions of the Constantinople Convention before the negotiators and avowedly used by them as a basis, the Rules would have been so specifically drawn as to obviate any doubt. As the text reads no such construction is admissible.

There is another significant omission in the Hay-Pauncefote Rules. The Constantinople Convention, in Articles IX and X, provides for certain measures for ensuring the execution of the treaty, for the maintenance of public order, and for the Imperial Ottoman Government ensuring

> by its own forces the defence of its other possessions situated on the eastern coast of the Red Sea.

Article XI says:

> The measures which shall be taken in the cases provided for by Articles IX and X of the present treaty shall not interfere with the free use of the canal. In the *same cases, the erection of permanent fortifications contrary to the provisions of Article VIII is prohibited.*[7]

The provisions of Article VIII referred to are found in the words:

> They (the Agents in Egypt of the Signatory Powers) shall especially demand the suppression of any work or the dispersion of any assemblage on either bank of the Canal, the object or effect of which might be to interfere with the liberty and the entire security of the navigation.

Article VII says, in part:

> The powers shall not keep any vessel of war in the waters of the Canal.

These prohibitions are not found in the Hay-Pauncefote Rules, and the British Government's view in this connection was expressed in a memorandum by Lord Lansdowne (August 3, 1901) communicated to Mr. Hay through Lord Pauncefote, in which is said:

> I understand that by the omission of all reference to the matter of defence the United States Government desires to reserve the power of taking measures to protect the canal, at any rate when the United States may be at war, from destruction or damage at the hands of an enemy or enemies. . . . . I am not prepared to deny that contingencies may arise when not

[7] Italics the writer's.

only from a national point of view, but on behalf of the commercial interests of the whole world, it might be of supreme importance to the United States that they should be free to adopt measures for the defence of the canal at a moment when they were themselves engaged in hostilities.[8]

There are four other protocols or conventions that have a bearing upon transit across the Isthmus. On December 1, 1900, protocols were signed with the representatives of both Costa Rica and Nicaragua agreeing that negotiations shall be entered into

when the President of the United States is authorized by law to acquire control of such portion of the territory now belonging to Costa Rica (Nicaragua) . . . . to construct and protect a canal . . . . from a point near San Juan del Norte on the Caribbean Sea, via Lake Nicaragua to Brito on the Pacific Ocean.

It was further agreed that the course and terminals of the Canal should be the same as

were stated in a treaty signed by the Plenipotentiaries of the United States and Great Britain on February 5, 1900, and now pending in the Senate of the United States for confirmation.

The Senate refused to confirm that treaty, and it was nearly a year later before the Hay-Pauncefote Treaty that is now in force was concluded.

In the Gadsden Treaty of 1853 with Mexico, certain provisions regarding interoceanic transit across the Isthmus of Tehuantepec by the plank and rail road were included that were of value to the United States, but which have no bearing on the Panama Canal.

There remains the Treaty of 1846 with New Granada, to which the Republic of Colombia has succeeded. It is entitled "Treaty of Peace, Amity, Navigation and Commerce,"[9] and only its Article 35 has a bearing on the present subject. That article reads, in part:

The United States of America and the Republic of New Granada desiring to make as durable as possible, the relations which are to be established between the two parties by virtue of this treaty, have declared solemnly, and do hereby agree to the following points.

1st. For the better understanding of the preceding articles, it is, and has been stipulated, between the high contracting parties, that the citizens, vessels, and merchandise of the United States shall enjoy in the ports of New Granada, including those of the part of the Granadian territory gen-

[8] Quoted in a paper by Professor Latané on the Neutralization Features of the Hay-Pauncefote Treaty in the Annual Report of the American Historical Association for 1902.

[9] Compilation of Treaties in Force, 1904, p. 194.

erally denominated *Isthmus of Panamá*, from its southernmost extremity until the boundary of Costa Rica, all the exemptions, privileges and immunities, concerning commerce and navigation, which are now, or may hereafter be enjoyed by Granadian citizens, their vessels and merchandise; and that this equality of favors shall be made to extend to the passengers, correspondence and merchandise of the United States in their transit across the said territory, from one sea to the other. The Government of New Granada guarantees to the Government of the United States, that the right of way or transit across the *Isthmus of Panamá* upon any modes of communication that now exist, or that may be, hereafter, constructed, shall be open and free to the Government and citizens of the United States, and for the transportation of any articles of produce, manufactures or merchandise, of lawful commerce, belonging to the citizens of the United States; that no other tolls or charges shall be levied or collected upon the citizens of the United States, or their said merchandise thus passing over any road or canal that may be made by the Government of New Granada, or by the authority of the same, than is under like circumstances levied upon and collected from the Granadian citizens; that any lawful produce, manufactures or merchandise belonging to citizens of the United States, thus passing from one sea to the other, in either direction, for the purpose of exportation to any other foreign country, shall not be liable to any import duties whatever; or having paid such duties, they shall be entitled to drawback, upon their exportation; nor shall the citizens of the United States be liable to any duties, tolls, or charges of any kind to which native citizens are not subjected for thus passing the said Isthmus. And, in order to secure to themselves the tranquil and constant enjoyment of these advantages, and as an especial compensation for the said advantages and for the favors they have acquired by the 4th, 5th and 6th articles of this Treaty, the United States guarantee positively and efficaciously to New Granada, by the present stipulation, the perfect neutrality of the beforementioned Isthmus, with the view that the free transit from the one to the other sea, may not be interrupted or embarrassed in any future time while this Treaty exists; and in consequence, the United States also guarantee, in the same manner, the rights of sovereignty and property which New Granada has and possesses over the said territory.

The remaining five sections of the article have no special interest in connection with this examination. In his message of January 4, 1904, President Roosevelt argues at length to maintain that this article descended to Panama at the time of her separation from Colombia, and is still in force. In this connection, also, Crandall says, in Treaties, their Making and Enforcement, p. 238:

> the provisions of Article XXXV of the treaty of 1846 . . . . have been considered as forming a covenant "that runs with the land, to the duties and benefits of which the new state of Panama succeeded."

Admitting that the article stands, and has descended to Panama,

and is not superseded by the Convention of November 18, 1903, a careful examination of its terms will show that:

(a) The general meaning of the article up to the neutrality clause has reference only to matters of commerce and peaceful communication.

(b) The possible exception is in the words

> The Government of New Granada guarantees to the Government of the United States, that the right of way or transit across the Isthmus of Panama upon any modes of communication that now exist, or that may be, hereafter, constructed, shall be open and free to the *Government*[10] and citizens of the United States;

though the context here points again to commercial matters.

(c) Not even to the United States is specifically granted authority for the transit of troops, though the use of troops is inferentially permitted by the guaranty clause.

(d) The transit of ships of war of the United States is not specifically granted, even in peace.

(e) Only inferentially by the use of the word "neutrality," and by the lack of any qualifying words to the expression "free transit," can the citizens or governments of foreign powers be considered to have any rights whatever under the article, and that construction is greatly, if not entirely vitiated by the opening words of the neutrality clause, which are "And, in order to secure to *themselves* . . . . "

The entire article seems to have been drawn with the interests of the United States and New Granada only in view, and without reference to any third power's sharing in similar benefits. The use of the word "neutrality" is not exact under any circumstances, and seems here to mean that the United States did not propose to have transit interrupted. As is known, this has repeatedly been construed to devolve upon the United States the duty of maintaining open transit during periods of domestic disorder. Certain it is that the word "neutrality" in this treaty conveys no such meaning as is carried by the word "neutralization" in the Constantinople Convention. Finally, in whatever light the Treaty of 1846 be considered as bearing on present-day conditions, there is nothing in it relating to Isthmian transit that is not more broadly and comprehensively stated in the Hay-Bunau-Varilla Convention.

[10] Italics the writer's.

The construction, control, maintenance and protection of the Panama Canal are thus seen to constitute a question between the United States, on the one hand, and Great Britain and Panama, on the other, as far as any direct treaty stipulations with foreign governments go.

II.

It will now be profitable to compare the provisions of the Hay-Pauncefote Treaty with those of the Clayton-Bulwer Treaty, and trace the history of the latter through the term of its existence. A remarkable change of attitude in the United States toward Isthmian Canal matters will be observed, which will shed great light upon the meaning to be ascribed to the expressions regarding "neutrality" and "neutralization" in our treaties with Great Britain and Panama.

The terms of the Clayton-Bulwer Treaty, whose title is "Convention Relative to a Ship Canal by Way of Nicaragua, Costa Rica, the Mosquito Coast, or Any Part of Central America,"[11] are so different from those of the Hay-Pauncefote Treaty that the former treaty is quoted almost in its entirety.

The United States of America and Her Britannic Majesty, being desirous of consolidating the relations of amity which so happily subsist between them by setting forth and fixing in a convention their views and intentions with reference to any means of communication by ship-canal, which may be constructed between the Atlantic and Pacific Oceans by the way of the river San Juan de Nicaragua and either or both of the lakes of Nicaragua or Managua, to any port or place on the Pacific Ocean, the President of the United States has conferred full powers on John M. Clayton, Secretary of State of the United States; and Her Britannic Majesty on the Right Honourable Sir Henry Lytton Bulwer, a Member of Her Majesty's Most Honourable Privy Council, Knight Commander of the Most Honourable Order of the Bath, and Envoy Extraordinary and Minister Plenipotentiary of Her Britannic Majesty to the United States, for the aforesaid purpose; and the said Plenipotentiaries having exchanged their full powers, which were found to be in proper form, have agreed to the following articles.

ARTICLE I.

The Governments of the United States and Great Britain hereby declare that neither the one nor the other will ever obtain or maintain for itself any exclusive control over the said ship-canal; agreeing that neither will ever erect or maintain any fortifications commanding the same, or in the vicinity thereof, or occupy, or fortify, or colonize, or assume or exercise

[11] Treaties and Conventions, 1776-1887, p. 440.

any dominion over Nicaragua, Costa Rica, the Mosquito coast, or any part of Central America; nor will either make use of any protection which either affords or may afford, or any alliance which either has or may have to or with any State or People for the purpose of erecting or maintaining any such fortifications, or of occupying, fortifying, or colonizing Nicaragua, Costa Rica, the Mosquito coast, or any part of Central America, or of assuming or exercising dominion over the same; nor will the United States or Great Britain take advantage of any intimacy, or use any alliance, connection or influence that either may possess, with any State or Government through whose territory the said Canal may pass, for the purpose of acquiring or holding, directly or indirectly, for the citizens or subjects of the one, any rights or advantages in regard to commerce or navigation through the said canal which shall not be offered on the same terms to the citizens or subjects of the other.

ARTICLE II.

Vessels of the United States or Great Britain traversing the said canal shall, in case of war between the contracting parties, be exempted from blockade, detention, or capture, by either of the belligerents; and this provision shall extend to such a distance from the two ends of the said canal as may hereafter be found expedient to establish.

ARTICLE III.

In order to secure the construction of the said canal, the contracting parties engage that, if any such canal shall be undertaken upon fair and equitable terms by any parties having the authority of the local government or governments through whose territory the same may pass, then the persons employed in making the said canal and their property used, or to be used, for that object, shall be protected, from the commencement of the said canal to its completion, by the Governments of the United States and Great Britain, from unjust detention, confiscation, seizure, or any violence whatsoever.

ARTICLE V.

The contracting parties further engage that when the said canal shall have been completed they will protect it from interruption, seizure, or unjust confiscation, and that they will guarantee the neutrality thereof, so that the said canal may forever be open and free, and the capital invested therein secure. Nevertheless, the Governments of the United States and Great Britain, in according their protection to the construction of the said canal, and guaranteeing its neutrality and security when completed, always understand that this protection and guarantee are granted conditionally, and may be withdrawn by both Governments, or either Government, if both Governments or either Government should deem that the persons or company undertaking or managing the same adopt or establish such regulations concerning the traffic thereupon as are contrary to the spirit and intention of this convention, either by making unfair discriminations in favor of the commerce of one of the contracting parties over the commerce

of the other, or by imposing oppressive exactions or unreasonable tolls upon passengers, vessels, goods, wares, merchandise, or other articles. Neither party, however, shall withdraw the aforesaid protection and guarantee without first giving six months notice to the other.

ARTICLE VI.

The contracting parties in this convention engage to invite every State with which both or either have friendly intercourse to enter into stipulations with them similar to those which they have entered into with each other; to the end that all other States may share in the honor and advantage of having contributed to a work of such general interest and importance as the canal herein contemplated. And the contracting parties likewise agree that each shall enter into treaty stipulations with such of the Central American States as they may deem advisable for the purpose of more effectually carrying out the great design of this convention, namely, that of constructing and maintaining the said canal as a ship communication between the two oceans, for the benefit of mankind, on equal terms to all, and of protecting the same; and they also agree that the good offices of either shall be employed, when requested by the other, in aiding and assisting the negotiation of such treaty stipulations; and should any difference arise as to right or property over the territory through which the said canal shall pass, between the States or Governments of Central America, and such differences should in any way impede or obstruct the execution of the said canal, the said Governments of the United States and Great Britain will use their good offices to settle such differences in the manner best suited to promote the interest of the said canal, and to strengthen the bonds of friendship and alliance which exist between the contracting parties.

ARTICLE VIII.

The Governments of the United States and Great Britain having not only desired, in entering into this convention, to accomplish a particular object, but also to establish a general principle, they hereby agree to extend their protection, by treaty stipulations, to any other practicable communications, whether by canal or railway, across the isthmus which connects North and South America, and, especially to the interoceanic communications, should the same prove to be practicable, whether by canal or railway, which are now proposed to be established by the way of Tehuantepec or Panama. In granting, however, their joint protection to any such canals or railways, as are by this Article specified, it is always understood by the United States and Great Britain that the parties constructing or owning the same shall impose no other charges or conditions of traffic thereupon than the aforesaid Governments shall approve of as just and equitable; and, that the same canals or railways, being open to the citizens and subjects of the United States and Great Britain on equal terms, shall also be open on like terms to the citizens and subjects of every other State which is willing to grant thereto such protection as the United States and Great Britain engage to afford.

It will be convenient to arrange the terms in parallel columns and then note how they compare in the two treaties.

CLAYTON-BULWER TREATY 1850	HAY-PAUNCEFOTE TREATY (as ratified) 1902
Neither the United States nor Great Britain will ever obtain or maintain for itself any exclusive control over the said Ship Canal. (Art. I.)	The canal may be constructed under the auspices of the government of the United States, which, under the terms of this treaty, shall enjoy all the rights incident to such construction, as well as the exclusive right of providing for the regulation and management of the canal.
Neither will ever erect or maintain any fortifications commanding the canal or in the vicinity thereof. (Art. I.)	This treaty is silent as to fortifications. The first draft, concluded Feb 5, 1900,[12] has as Rule 7, Article II, a clause prohibiting fortifications commanding the canal or the waters adjacent.
Neither party will ever occupy, fortify, colonize, assume or exercise any dominion over Nicaragua, Costa Rica, the Mosquito Coast, or any part of Central America; nor to that end will either make use of any alliance, or protection afforded (Art. I.)	This treaty is silent.
"Vessels of the United States or Great Britain, traversing the said Canal shall, in case of war *between the contracting parties*,[13] be exempted from blockade, detention or capture, by either of the belligerents; and this provision shall extend to such a distance from the two ends of the said canal as may hereafter be found expedient to establish." (Art. IV.)	This treaty is silent, except for the general "neutralization" Rules.
The two powers engage that the finished canal shall be protected by them "from interruption, seizure, or	The dual guarantee of the Clayton-Bulwer Treaty becomes here a sole guarantee by the United States,

[12] Foreign Relations, 1901, p. 243.

[13] Italics the writer's.

unjust confiscation, and that they will guarantee the neutrality thereof, so that the said canal may forever be open and free." (Art. V.)	Article III, reading: "The *United States*[13] adopts, as the basis of the neutralization of such ship canal, the following Rules," etc. The earlier draft of Feb. 5, 1900, reads: "The High Contracting Parties .... adopt", etc.
They "engage to invite every state with which both or either have friendly intercourse to enter into stipulations with them similar to those which they have entered into with each other." (Art. VI.)	This treaty has no reference to the association of foreign powers with the United States in any guaranty of neutralization. The draft of Feb. 5, 1900, had as Article III, the following: "The High Contracting Parties will, immediately upon the exchange of the ratifications of this Convention, bring it to the notice of the other Powers and invite them to adhere to it." The Senate struck this out, and otherwise amended the treaty, which in its amended form, was not acceptable to Great Britain. The final treaty, however, is even less restrictive upon the United States than would have been this draft, as amended.
In order to establish a general principle, they agree to extend their protection, not alone to a canal at Nicaragua, but also "to any other practicable communications, whether by canal or railway, across the Isthmus . . . . , and, especially to the interoceanic communications,—should the same prove to be practicable, whether by canal or railway, —which are now proposed to be established by the way of Tehuantepec, or Panama." (Art. VIII.)	The preamble adheres to the "general principle," the remainder of the Clayton-Bulwer Treaty being superseded by Article I.

[13] Italics the writer's.

The Clayton-Bulwer Treaty was an attempt to settle controverted matters that had become acute. The need for a canal was recognized in both countries, and each was jealous of the other's getting any exclusive control over it. The United States had asserted the Monroe Doctrine in 1823, and had recently, 1846,

concluded the treaty with New Granada. But the probable location of the Canal at that time was in Nicaragua, and there the British had assumed a protectorate over the Mosquito tribe of Indians; and in June, 1848, they supported the Chief in a claim to the coast extending from the mouth of the San Juan River northward for some 500 miles. This included Greytown, the eastern terminus of the Nicaragua Canal, and gave Great Britain virtual control over the Canal route. The attitude in the United States when the treaty was concluded in 1850 was one of extreme irritation, and Mr. Clayton, then Secretary of State, doubtless accepted less definite and favorable terms than he might have insisted on had he not feared the outbreak of war. While the treaty averted war, it was unfortunately vague in certain particulars concerning Great Britain's position in Central America, and was unsatisfactory to the United States from the first. The early sources of dissatisfaction, however, were in relation to Great Britain's tenure in Central America, and not with the features relating to the joint engagement of the two countries regarding the projected Canal itself. For ten years the two countries played at cross-purposes until, in 1860, after Great Britain had concluded new treaties with Honduras and Nicaragua, relinquishing the Mosquito Protectorate, President Buchanan in his message (Dec. 3) said:

> The discordant construction of the Clayton-Bulwer Treaty between the two governments, which, at different periods of discussion, bore a threatening aspect, has resulted in a final settlement entirely satisfactory to this government.

Here is no hint of any desire for exclusive control by the United States, but entire satisfaction with a final settlement of the construction of the treaty in which that point had not been raised; the United States was satisfied that Great Britain had placed herself outside of any claim to exclusive control. Henderson, p. 137, American Diplomatic Questions, says:

> Fundamentally, the motives of these disagreements may be traced largely to suspicion. While neither party actually sought a monopoly of political control over the canal route, each power distrusted the other, and was ready to detect in every move of its opponent a covert attempt to secure those forbidden advantages.

As a matter of fact the treaty was a legitimate outcome of the policy of the United States Government up to that time as ex-

pressed by both executive and legislative branches. In 1826, three years after the enunciation of the Monroe Doctrine, Henry Clay, in his instructions to the delegates to the Panama Congress, said:

> If a canal across the Isthmus be opened so as to admit of sea-vessels from ocean to ocean, the benefits of it ought not to be exclusively appropriated to any one Nation; but should be extended to all parts of the globe upon the payment of a just compensation or reasonable tolls.

On March 3, 1835, the Senate passed unanimously a resolution requesting President Jackson to consider the expediency of opening negotiations with other governments concerning Canal matters, in which occurs the expression:

> securing for ever, by such stipulations, the free and equal right of navigating such canal to all such nations.

In 1839 the House, also unanimously, passed a resolution containing practically the identical expression quoted above. In 1846 came the treaty with New Granada already quoted; and, speaking of the Senate resolution quoted above in connection with that treaty, President Polk said:

> There does not appear to be any other effectual means of securing to all nations the advantages of this important passage but the guarantee of great commercial powers that the Isthmus shall be neutral territory. The interests of the world at stake are so important that the security of this passage between the two oceans cannot be suffered to depend upon the wars and revolutions which may arise among different nations.

On Nov. 8, 1849, the American Minister, Mr. Lawrence, inquired of Lord Palmerston, among other things,

> whether the British Government will unite with the United States in guaranteeing the neutrality of a ship-canal, railway or other communication to be open to the world and common to all nations.

In his message to Congress, Dec. 4, 1849, President Taylor said:

> should such a work be constructed, under the common protection of all nations, for equal benefits to all, it would be neither just nor expedient that any great maritime state should command the communications. . . . . No such power should occupy a position that would enable it hereafter to exercise so controlling an influence over the commerce of the world, or to obstruct a highway which ought to de dedicated to the common use of mankind.

Then came the Clayton-Bulwer Treaty.

Throughout the years up to the Civil War, no desire for sole control was manifested in the United States. The underlying motive

was the wish to have the Canal commercially free and open—an Open Canal Door, so to speak. As far as any military use of the Canal was concerned, that point of view did not greatly appeal to our people as yet, and inasmuch as they had equal rights under the treaty with Great Britain and all foreign nations they were content. Indeed, with dual control, or multiple control, the only solution practicable was the unrestricted right of all to use the Canal in a military way, *i. e.*, for the passage of war vessels whether intent on war or peace.

After the Civil War a change in sentiment toward Canal matters began to manifest itself. Quoting Henderson, p. 138:

> The United States emerged from its four years' conflict with enlarged ideas of her position in the world; the seeds of a new and more aggressive foreign policy had been sown. The progress of those ideas is marked by the Alaskan purchase, the attempts to secure naval bases in the West Indies, the expulsion of the French from Mexico, and by the evidences of a belief, then gradually forming in the minds of the people, that the United States should exercise sole political control over any Central American canal that should ever be built.

The rapid growth of the Pacific Coast, and the solidarity of the country resulting from the completion of the trans-continental railways, also doubtless directed attention to the Canal and to the undesirability of having it under any degree of control by foreign powers. In 1880 President Hayes, in a special message (March 8) used the words so often quoted since:

> The policy of this country is a canal under American control. The United States cannot consent to the surrender of this control to any European power, or to any combination of European powers . . . . An interoceanic canal across the American Isthmus will essentially change the geographical relations between the Atlantic and Pacific coasts of the United States, and between the United States and the rest of the world. It will be the great ocean thoroughfare between our Atlantic and Pacific shores, and *virtually a part of the coast line*[14] of the United States. Our merely commercial interest in it is greater than that of all other countries, while its relations to our power and prosperity as a nation, to our means of defense, our unity, peace, and safety, are matters of paramount concern to the people of the United States. No other great power would, under similar circumstances, fail to assert a rightful control over a work so closely and vitally affecting its interest and welfare.[15]

But the new note was struck several years before 1880. Secretary Seward, who in 1862 thought the interest of the United

[14] Italics the writer's.

[15] Snow's Topics in American Diplomacy, p. 340.

States in the Panama route no "different from that of other maritime powers," and instructed our Ministers to Paris and London to inquire whether France and England would

> unite with the United States in guaranteeing the safety of the transit route and the authority of the New Granadian confederation,[16]

said, shortly after the expulsion of the French from Mexico:

> The United States would not permit a public enemy of the American continent the use or advantages of a work executed by nations of the New World.[17]

Although the Dickinson-Ayon Treaty with Nicaragua, concluded in 1867 (denounced by Nicaragua in 1902), had a clause in Art. XV embodying the agreement of the United States to use its influence

> to induce them (other nations) to guarantee such neutrality and protection to all such routes of communication,

yet in 1868, in negotiating a new treaty with Colombia, Secretary Seward

> inserted a clause that enemies of the United States should be excluded from the use of the proposed canal in time of war.[18]

Colombia rejected this clause, being in favor of international control, and the United States Senate failed to recommend the ratification of the treaty. Rodrigues, in The Panama Canal, pp. 186-7, says that a new treaty was concluded by Minister Hurlbut in January, 1870, in which the United States guaranteed to Colombia that the Canal and its dependencies should be exempt from all hostile acts by other nations, and that both agreed to obtain from other nations a guarantee of like import. But:

> Both parties reserved the right of passing their ships of war at all times, but the canal will be closed against the flag of all nations which may be at war with either of the contracting parties.

And he quotes Secretary Fish as follows, in reply to a memorandum from Mr. Hurlbut setting forth the Colombian desire to have a joint protectorate, all nations having equal control:

> In the present state of international law such joint protectorate would be a source of future trouble, ... and might probably prove an obstacle to the ratification by the United States Senate of a treaty on the subject.

From the foregoing it appears that the Civil War marked the

[16] Henderson, p. 138.
[17] Snow's Topics, p. 338.
[18] Henderson, p. 139.

turn in the tide of opinion in this country from dual, or multiple, control and guarantee of neutrality to single control. After President Hayes' outspoken declaration in 1880 the latter sentiment grew, and it finally showed out as a definite policy of conviction after the Spanish War left the United States with added responsibilities and a broader view of its position in the family of nations. But the Clayton-Bulwer Treaty stood squarely across the path of this policy, and until it was removed the policy could not be made effective. Of the efforts during the years from 1880 to 1901, to have the treaty modified, and of the less worthy efforts to show that it might be considered as voidable, it is unnecessary for the present purpose to speak; the change of sentiment has been dwelt upon because of its bearing on the Hay-Pauncefote Treaty as finally concluded.

But this change of sentiment, great as it was, was not complete because it only here and there showed signs that the military necessities of the United States were well understood. As an evidence of this it is only necessary to recall the original Hay-Pauncefote Treaty, concluded February 5, 1900, but not ratified, with its dual adoption of the Constantinople Rules, its agreement to invite foreign nations to adhere to it, and its prohibition of fortifications. Although objectionable features of the Clayton-Bulwer Treaty were removed so that the United States could own, construct and manage the Canal, the original Hay-Pauncefote draft failed to supersede that objectionable instrument explicitly, and included the three matters above noted. Even the Senate, though it struck out the article inviting the adherence of foreign powers and inserted a clause superseding the Clayton-Bulwer Treaty, and also one

> for securing by its own forces the defense of the United States and the maintenance of public order,

yet recommended the ratification of the treaty with the prohibition of fortification included. Thus slowly did the idea of the *military* value of the Canal to the United States gain ground. That it at last did assert itself the treaty ratified in 1902 bears witness, with its remarkable and most significant omissions, which can only be understood in the light of a knowledge of what those omissions are and why they were made.

Summing up, "control" of the Canal now means to us the sole right to own, construct, maintain, operate and protect the Canal,

and in doing the last we are not forbidden to fortify, nor to use our land and naval forces. Can this possibly mean that we must let our enemies in war have free use of the Canal *militarily* because we have entered into arrangements with two nations for the free use by mankind of the Canal under certain Rules for "neutralization"? The idea is unthinkable, certainly to the minds of men trained in military matters.[19] In case of war with England, the treaty would go by the board; in case of war with any other martitime power, no direct treaty obligations exist. The only possible objection to our forbidding the Canal to the military use of possible enemies is that, by a solemn declaration to two powers, but to two powers only, we have "adopted" certain Rules as a basis for the "neutralization" of the Canal. If we are not at war ourselves, we are, by the moral obligation of those two treaties, bound to make the Canal actually neutral water to other belligerents. But why, if we are not to enjoy the military advantages that control and the right to fortify give when at war ourselves, should we have insisted upon being the sole guarantor, and, in effect at least, have insisted upon the right to fortify?

III.

Neutrality, as applied to a state, may be described as an attitude of its government, *voluntarily assumed by itself alone,* of abstention from acts in favor of either belligerent in a war to which the state practising neutrality is not a party. Inherent to the idea of neutrality is a state of war that calls it forth; moreover, since neutrality is only founded on voluntary action, it is terminable at the will of the nation practising it.

Neutralization, on the other hand, is an attitude *imposed by conventional arrangement* upon a government, usually, but not necessarily, with its consent, by virtue of which it always remains neutral in a war between other states, its territory is exempted from warlike acts of belligerents, and its own immunity from attack is guaranteed. Such a guarantee, to be effective, can only be given by a concert of powers.

By a natural extension of language the term neutralization is applied to persons and things, and has thus come into use in con-

[19] This statement appears to have been too broad; one American military writer, at least, has advocated this view in print since the statement was originally written.—H. S. K.

nection with the Suez and Panama Canals. Undoubtedly there is a proper use of the term in this connection; but it is also true that the word has been used in a loose and inexact way, not only in informal speech and print, but as well in formal documents, and even in treaties. Latané[20] considers Holland the first writer of recognized merit to give a definition of the term "neutralization." Holland says:[21]

So far "neutrality" is always the correlative of "belligerency." A State is neutral which chooses to take no part in a war, and persons and property are neutral which belong to a State occupying this position. The term has in recent times received a larger application. A condition of neutrality, or one resembling it, has been created, as it were, artificially, and the process has been called "neutralization."

States have been permanently neutralized by convention. Not only is it preordained that such States are to abstain from taking part in a war into which their neighbors may enter, but it is also prearranged that such States are not to become principals in a war. By way of compensation for this restriction on their freedom of action, their immunity from attack is guaranteed by their neighbors, for whose collective interests such an arrangement is perceived to be on the whole expedient.

"To neutralize" should mean "to bestow by convention a neutral character upon States, persons, and things which would or might otherwise bear a belligerent character."

Lawrence says:[22]

In ordinary neutrality there are two elements—the element of abstention from acts of war, and the element of freedom to abstain or not to abstain at pleasure. Take away the latter and we obtain neutralization. A neutral state can, if it pleases, cease to be neutral and join in the war. . . . . Neutralized states, persons and things, occupy exactly the same position towards hostilities actually in progress as neutral states, persons or things; but they differ from the latter in that they are bound by international agreement to take no part in warlike acts, and are protected from warlike operations as long as they respect this obligation.

So great a change in their legal position cannot be made without the consent of all parties affected thereby. A power is incapable of neutralizing its territory by its own mere declaration, because the rights and duties of other powers would be altered considerably by such neutralization, and their consent must therefore be obtained before it can be legally carried out. Similarly two or three powers are incapable of neutralizing the territory of one of their number; for they have not authority to legislate for the civilized world, and to warn other powers off a spot where belligerent

[20] The Neutralization Features of the Hay-Pauncefote Treaty, cited above.

[21] Studies in International Law, pp. 271 and 275.

[22] The Principles of International Law, Sec. 245, pp. 485 and 486.

operations could previously be carried on by all who chose to go to war with the state which owned it. The common law of nations cannot be overridden by the *ipse dixit* of one of the communities subject to it, or even by a group of them. The change, if it is to be internationally valid, must be the result of a general agreement. At the very least it must be accepted by all the important states concerned in the matter. Any smaller number may bind themselves to one another to protect a territory from hostile operations; but they cannot alter its international *status*, or render an attack upon it an offence against the public law of the civilized world.

Wharton says:[23]

It is to be observed that the word "neutrality" in the convention of 1846, is not used in the technical sense of "neutralization." "Neutralization" . . . . is the assignment to a particular territory or territorial water of such a quality of permanent neutrality in respect to all future wars as will protect it from foreign belligerent disturbance. This quality can only be impressed by the action of the great powers by whom civilized wars are waged and by whose joint interposition such wars could be averted. As the "neutrality" of the Isthmus is, by the convention before us, guaranteed only by the United States, it is not a neutralization in the above sense, but only a pledge and guarantee of protection.

For other references in this connection see Annuaire de l'Institut de Droit International, 1878-9; Manuel de Droit International Public, Bonfils, 1905, secs. 1443 and 348, 349, 359, 361; America's Foreign Policy, Woolsey, 1898, pp. 147-9; American Diplomatic Questions, Henderson, 1901, pp. 179-81.

After quoting Holland and Lawrence, in part as above, and briefly mentioning well-known cases of neutralization, Latané goes on to say:

It follows, from a study of the foregoing cases, that neutralization implies:—(1) a formal act or agreement. It is a matter of convention constituting an obligation—not a mere declaration revocable at will. (2) It implies a sufficiently large number of parties to the act to make the guaranty effective. (3) It implies absence of fortifications. The mere existence of fortifications would impeach the good faith of the parties to the agreement.[24] (4) It implies certain limitations of sovereignty over the territory or thing neutralized. (5) It implies a more or less permanent condition. In this it differs from ordinary treaty stipulations terminated by war between the contracting partes. A treaty establishing neutralization is brought into full operation by war.

When we come to extend the same principle to waterways, however, we find the conditions to be altogether different. The first and most fundamental difference is that States have acquired by international usage and

[23] International Law Digest, Vol. II, Sec. 145, p. 114.

[24] The statement of (3) is open to discussion, but is quoted here as written.

prescription, rights and interests in the territorial waters of other States which they have no claim to exercise in respect to land. Secondly, armies and implements of war are absolutely excluded from the territory of neutralized States, while neutralized waterways are by design open to the innocent passage of warships, not only in time of peace but also in time of war. Thirdly, the warfare of the future will in all probability be confined more and more to the sea, thus enhancing the strategical value of waterways and canals which are adjuncts to the high seas as well as increasing the temptation to appropriate them for national purposes.[25]

IV.

The Suez and Panama Canals are waterways in a class by themselves having these points of similarity: each is an artificial passage through an isthmus connecting two continents; by each many sea routes are shortened thousands of miles; each lies entirely within the territory of a weak power, unable to protect it. Had either been wholly within the territory of a strong power, able to finance and construct it, and to protect it afterward, there can be little doubt of its status, which would have been just what that strong power chose to make it. There are points of dissimilarity also, one being that, whereas the Suez Canal was financed and constructed by a private company, of which the Government of Great Britain is now, but was not originally, a shareholder, the Panama Canal is entirely a government enterprise of the United States. Another is the comparative proximity of the Suez Canal to several powerful European nations, while an ocean separates the Panama Canal from all nations of the first class except the United States. A third is the fact of the paramount interest of the United States in the Panama Canal because of its relation to communications between the Atlantic and Pacific coasts. President Hayes' remark that a canal on the Isthmus is virtually a part of our coast line has taken over twenty years to be impressed in its full significance upon the American public; but it has been so impressed at last, resulting in governmental finance, construction and control. It is true that Great Britain has far greater interest in the Suez Canal than any other power because of her tremendous commerce and the defense of her eastern possessions; but her interest is bound up with the Suez Canal in an entirely different way from that of the United States in the Panama Canal. Her great concern is in free passage for her commerce, and neutralization of the Canal is to her great advantage. A nation standing across the Mediterranean

[25] The Neutralization Features of the Hay-Pauncefote treaty, cited above.

at its narrowest part, and commanding the entrance to the Red Sea from Perim Island and Aden, need not worry unduly about the actual use of the Suez Canal proper by an enemy power. At the meeting of delegates in Paris in 1885 (to consider the financial position of Egypt), the Russian delegate, M. Hirovo, maintained that

> the treaty would be illusory unless the approaches of the canal were made to comprise a neutral passage through the Red Sea into the Gulf of Aden. (See International Law, Westlake, Part I, p. 328.)

In spite of the dissimilarities in the two cases, the status of the Suez Canal is the only practical precedent with which to study that of the Panama Canal, and hence the former must be thoroughly understood. The early history of the Suez Canal may be briefly stated. It was built by a company organized by de Lesseps under a firman granted in 1856, and was opened in 1869. During this period the British Government's attitude was one of uncompromising hostility, and eminent British engineers and the British press had declared its impracticability, or its commercial failure if completed. As soon as it had justified itself, however, Great Britain was not slow to recognize her interest in it, and when Egyptian embarrassments placed upon the market the shares held by the Khedive the British Government purchased them in 1875, thus becoming the largest shareholder. In 1882 occurred the revolt of Arabi, attended by the massacre at Alexandria. Upon Great Britain alone fell the task of restoring order, though she invited France and Italy to undertake it with her. Both declined, and the action of France in particular was short-sighted, as shown by subsequent events. Great Britain's forces occupied Egypt, and she has not seen the way clear as yet to withdraw her troops. This naturally has been a source of irritation to France until, in 1904, the matter was adjusted by the Anglo-French *entente*, in which it was one of a number of questions amicably settled by mutual concessions.

When the Suez Canal was constructed there was no precedent upon which to base its status with respect to free navigation, and we may therefore expect to find an evolution of sentiment in this regard. The firman of 1856 said, in Article XIV:

> We solemnly declare, for us and our successors, subject to the ratification of His Imperial Majesty, the Sultan, the Grand Maritime Canal from Suez to Pelusium, and its dependent ports, open forever as neutral passages to all ships of commerce passing from one sea to the other . . .

This was repeated in another firman ten years later, in which, by Article 10, the Egyptian Government reserved the right of

> occupying every position or strategical point which it should deem necessary for the defense of the country, such occupation not to obstruct the navigation . . . .

The Sultan confirmed this firman in March, 1866.

When the Canal was opened it was thus territorial water, and in the charter granted by the sovereign power, a weak one, to the foreign constructing and operating company, the only stipulation regarding free use referred to merchant vessels alone. But it was used by the war vessels of both belligerents in the Franco-Prussian War without complaint, though no formal stipulation had been made by the Porte allowing its use by any war vessels whatever.

In 1873 the international movement toward a definitive agreement about the Canal began when the Sultan invited an international commission to sit at Constantinople. Its object was to arrange a schedule of dues, about which disputes had arisen, and in its scale dues for men-of-war and transports were inserted without any exception of belligerents. Nys quotes one of its resolutions as follows:

> désormais la navigation du Canal de Suez serait commune aux bâtiments de commerce, aux bâtiments de guerre et aux bâtiments affrétés pour le transport des troupes.

The declaration was signed by the representatives of all the maritime powers of Europe except Portugal, by the Porte, and by the Canal Company, and was proclaimed by the Porte in December of that year.

But the question was not considered satisfactorily settled, for no provision in precise terms covered the case of a war in which the Porte might be a belligerent, and discussion went on. In 1875, the same year in which Great Britain became a shareholder, Sir Travers Twiss proposed the neutralization of the Canal, and the subject was considered by the Institute of International Law, which adopted a proposed international declaration in 1879. Meantime, in 1877-8 occurred the Russo-Turkish War in which Turkey was a belligerent, and the British Government early in 1877 seized the occasion to announce at a meeting of the shareholders, and to send a communication of the same import to the Russian ambassador, that

An attempt to blockade or otherwise interfere with the canal or its approaches would be regarded by Her Majesty's government as a menace to India and a grave injury to the commerce of the world. On both these grounds any such step, which they hope and believe there is no intention on the part of either belligerent to take, would be incompatible with the maintenance by them of an attitude of passive neutrality . . . . Her Majesty's government are firmly determined not to permit the canal to be made the scene of any combat or warlike operations.

Russia replied that

the Imperial cabinet will neither blockade nor interrupt, nor in any way menace, the navigation of the Suez Canal.

Great Britain also sent an intimation of the same nature to the Porte and the Khedive. In May, 1877, de Lesseps made a proposition to the British Government for the neutralization of the Canal, to which Lord Derby replied that the proposal was "open to so many objections of a political and practical character" that the British Government could not undertake to recommend it.

The Porte's adoption of the work of the international commission of 1873, England's attitude in 1877, and Russia's acquiescence, together constituted a status, by general understanding but not by convention, that no hostilities nor warlike operations should take place in the Canal, that its mouths should not be subject to blockade, that on such a footing the Canal should be free to ships of war of belligerents, and that Turkey, if a belligerent, should stand on the same footing in this regard as other powers. When Great Britain intervened single-handed in Egypt in 1882, she occupied the line of the Canal, but it was not in violation of the spirit of this understanding, for she undertook her task singly only after failing to get the co-operation of France and Italy, she did it under the authority and in the interest of the Khedive, and one great object was to protect the Canal itself.

But it was evident that the status of the Canal virtually in the control of the strongest maritime power of the world, as was the case after Great Britain's intervention and especially after the refusal of that country to share again with France the dual control in Egypt that had existed prior to 1882, could not be satisfactory to the other powers. Great Britain recognized the necessity for a definite conventional agreement in 1883 when (January 3) Lord Granville addressed a circular note to the great European powers suggesting a series of rules as a basis

to put upon a clearer footing the position of the Canal for the future, and to provide against possible dangers,

thus reversing the position taken by Lord Derby in 1877. Lord Granville's dispatch bore little fruit until early in 1885, when the representatives of the great powers met in London to reconsider the financial position of Egypt. Among other things their Declaration provided for a commission to meet in Paris March 30 for the preparation of an act for

> the establishment of a definitive regulation, guaranteeing at all times, and for all Powers, the freedom of the Suez Canal . . . . taking for its basis the circular of the Government of Her Britannic Majesty of January 3, 1883.

The commission met, debated, and adjourned on June 17 without reaching any conclusion. During the autumn it was

> ascertained that the other Powers were ready to concur in any solution of the question in dispute which might be acceptable both to Great Britain and France. Negotiations were accordingly resumed between those Powers on November 12, and a Convention was signed on their behalf at Paris, on October 24, 1887, which after receiving the approval of the other Powers in succession, that of the Porte being delayed till June 29, 1888, was eventually signed at Constantinople on October 29, by the Plenipotentiaries of the nine Powers, and was ratified on December 22, 1888.[28]

Westlake, Part I, p. 328, says:

> The ratifications were deposited at Constantinople on 22 Dec. 1888, but not exchanged;

this statement is not verified by any references at hand, though it is intrinsically probable for reasons that will now appear. At the last sitting of the Commission at Paris on June 13, 1885, Sir Julian Pauncefote made the following reservation on the part of his government:

> The delegates of Great Britain, in presenting this text of a treaty as the definitive régime intended to guarantee the free use of the Suez Canal, consider it their duty to formulate a general reservation as to the application of its provisions in so far as they would not be compatible with the transitory and exceptional state in which Egypt now exists and as they might fetter the freedom of action of their government during the occupation of Egypt by the forces of Her Britannic Majesty.

This reservation was repeated by Lord Salisbury before the convention was signed in 1887, and carefully brought to the knowledge of all the powers concerned. On July 12, 1898, Mr. Curzon replied in Parliament to a question:

> The Convention in question (that of Constantinople, 1888) is certainly in existence, but . . . . has not been brought into practical operation. This

[28] Studies in International Law, Holland, p. 288.

is owing to the reserves made on behalf of Her Majesty's Government by the British delegates at the Suez Canal Commission in 1885, which were renewed by Lord Salisbury, and communicated to the Powers in 1887.

Here is a condition short of complete fulfilment of the terms of the convention, and it may very possibly have prevented the exchange of the ratifications. The terms of the convention are given below, and it will be observed that the word "neutralization" does not occur. The convention was signed by representatives of Great Britain, Germany, Austria, Spain, France, Italy, the Netherlands, Russia and Turkey.

The preamble recites that the several rulers

wishing to establish, by a Conventional Act, a definite system destined to guarantee at all times, and for all the Powers, the free use of the Suez Maritime Canal, and thus to complete the system under which the navigation of this Canal has been placed by the Firman of His Imperial Majesty the Sultan, dated the 22nd February, 1866 (2 Zilkade, 1282), and sanctioning the Concessions of His Highness the Khedive, have named as their Plenipotentiaries . . . . who . . . . have agreed upon the following Articles:—

ARTICLE I.

The Suez Maritime Canal shall always be free and open, in time of war as in time of peace, to every vessel of commerce or of war, without distinction of flag.

Consequently, the High Contracting Parties agree not in any way to interfere with the free use of the Canal, in time of war as in time of peace.

The Canal shall never be subjected to the exercise of the right of blockade.

ARTICLE II.

The High Contracting Parties, recognizing that the Fresh-Water Canal is indispensable to the Maritime Canal, take note of the engagements of His Highness the Khedive towards the Universal Suez Canal Company as regards the Fresh-Water Canal, which engagements are stipulated in a Convention bearing date the 18th March, 1863, containing an *exposé* and four Articles.

They undertake not to interfere in any way with the security of that canal and its branches, the working of which shall not be exposed to any attempt at obstruction.

ARTICLE III.

The High Contracting Parties likewise undertake to respect the plant, establishments, buildings, and works of the Maritime Canal and of the Fresh-Water Canal.

ARTICLE IV.

The Maritime Canal remaining open in time of war as a free passage, even to the ships of war of belligerents, according to the terms of Article I of the present Treaty, the High Contracting Parties agree that no right of war, no act of hostility, nor any act having for its object to obstruct the free navigation of the Canal, shall be committed in the Canal and its ports of access, as well as within a radius of 3 marine miles from those ports, even though the Ottoman Empire should be one of the belligerent Powers.

Vessels of war of belligerents shall not revictual or take in stores in the Canal and its ports of access, except in so far as may be strictly necessary. The transit of the aforesaid vessels through the Canal shall be effected with the least possible delay, in accordance with the Regulations in force, and without any other intermission than that resulting from the necessities of the service.

Their stay at Port Said and in the roadstead of Suez shall not exceed twenty-four hours, except in case of distress. In such case they shall be bound to leave as soon as possible. An interval of twenty-four hours shall always elapse between the sailing of a belligerent ship from one of the ports of access and the departure of a ship belonging to the hostile Power.

ARTICLE V.

In time of war belligerent Powers shall not disembark nor embark within the Canal and its ports of access either troops, munitions, or materials of war. But in case of an accidental hindrance in the Canal, men may be embarked or disembarked at the ports of access by detachments not exceeding 1,000 men, with a corresponding amount of war material.

ARTICLE VI.

Prizes shall be subjected, in all respects, to the same rules as the vessels of war of belligerents.

ARTICLE VII.

The Powers shall not keep any vessel of war in the waters of the Canal (including Lake Timsah and the Bitter Lakes).

Nevertheless, they may station vessels of war in the ports of access of Port Said and Suez, the number of which shall not exceed two for each Power.

This right shall not be exercised by belligerents.

ARTICLE VIII.

The Agents in Egypt of the Signatory Powers of the Present Treaty shall be charged to watch over its execution. In case of any event threatening the security or the free passage of the Canal, they shall meet on the summons of three of their number under the presidency of their Doyen, in order to proceed to the necessary verifications. They shall inform the Khedivial Government of the danger which they may have perceived, in

order that that Government may take proper steps to insure the protection and the free use of the Canal. Under any circumstances, they shall meet once a year to take note of the due execution of the Treaty.

The last-mentioned meetings shall take place under the presidency of a Special Commissioner nominated for that purpose by the Imperial Ottoman Government. A Commissioner of the Khedive may also take part in the meeting, and may preside over it in case of the absence of the Ottoman Commissioner.

They shall especially demand the suppression of any work or the dispersion of any assemblage on either bank of the Canal, the object or effect of which might be to interfere with the liberty and the entire security of the navigation.

ARTICLE IX.

The Egyptian Government shall, within the limits of its powers resulting from the Firmans, and under the conditions provided for in the present Treaty, take the necessary measures for insuring the execution of the said Treaty.

In case the Egyptian Government should not have sufficient means at its disposal, it shall call upon the Imperial Ottoman Government, which shall take the necessary measures to respond to such appeal; shall give notice thereof to the Signatory Powers of the Declaration of London of the 17th March, 1885; and shall, if necessary, concert with them on the subject.

The provisions of Articles IV, V, VII, and VIII shall not interfere with the measures which shall be taken in virtue of the present Article.

ARTICLE X.

Similarly, the provisions of Articles IV, V, VII, and VIII shall not interfere with the measures which His Majesty the Sultan and His Highness the Khedive, in the name of His Imperial Majesty, and within the limits of the Firmans granted, might find it necessary to take for securing by their own forces the defence of Egypt and the maintenance of public order.

In case His Imperial Majesty the Sultan, or His Highness the Khedive, should find it necessary to avail themselves of the exceptions for which this Article provides, the Signatory Powers of the Declaration of London shall be notified thereof by the Imperial Ottoman Government.

It is likewise understood that the provisions of the four Articles aforesaid shall in no case occasion any obstacle to the measures which the Imperial Ottoman Government may think it necessary to take in order to insure by its own forces the defence of its other possessions, situated on the eastern coast of the Red Sea.

ARTICLE XI.

The measures which shall be taken in the cases provided for by Articles IX and X of the present Treaty shall not interfere with the free use of the Canal. In the same cases, the erection of permanent fortifications contrary to the provisions of Article VIII is prohibited.

ARTICLE XII.

The High Contracting Parties, by application of the principle of equality as regards the free use of the Canal, a principle which forms one of the bases of the present Treaty, agree that none of them shall endeavour to obtain with respect to the Canal territorial or commercial advantages or privileges in any international arrangements which may be concluded. Moreover, the rights of Turkey as the territorial Power are reserved.

ARTICLE XIII.

With the exception of the obligations expressly provided by the clauses of the present Treaty, the sovereign rights of His Imperial Majesty the Sultan, and the rights and immunities of His Highness the Khedive, resulting from the Firmans, are in no way affected.

ARTICLE XIV.

The High Contracting Parties agree that the engagements resulting from the present Treaty shall not be limited by the duration of the Acts of Concession of the Universal Suez Canal Company.

ARTICLE XV.

The stipulations of the present Treaty shall not interfere with the sanitary measures in force in Egypt.

ARTICLE XVI.

The High Contracting Parties undertake to bring the present Treaty to the knowledge of the States which have not signed it, inviting them to accede to it.

The express and only reason given by Great Britain for any reservations was the " transitory and exceptional state " of Egypt. That " state " exists still so far as the continued occupation of Egypt by Great Britain goes, but the conditions are now entirely changed by the Anglo-French *entente*. At the time the Constantinople Convention was concluded the British occupation of Egypt was bitterly opposed in France, and to this opposition may be traced the reservations made by Great Britain. When, however, France and Great Britain came to a happy understanding in 1904, the occupation of Egypt was acquiesced in by France—virtually confirmed—so long as Great Britain considers it to her interest to remain. Hence, as Great Britain's chief concern in Egypt was with France when the Constantinople Convention was concluded, the arrival at the understanding of 1904 made it no longer necessary to hold to the reservations of 1885 and 1887. This is borne out by the statement made on August 8, 1904, by

Earl Percy, in the House of Commons, replying to a question addressed to the Under Secretary for Foreign Affairs. He remarked that Germany, Austria-Hungary and Italy have

> undertaken not to obstruct the action of Great Britain in Egypt by asking that a limit of time be fixed for the British occupation, or in any other manner, and agreed that the execution of the last sentence of par. 1, as well as all of par. 2 of Art. VIII of the Treaty of October 29, 1888, shall remain in abeyance.[37]

The Anglo-French Declaration[38] was made on April 8, 1904. Article I says in part:

> His Britannic Majesty's Government declare that they have no intention of altering the political status of Egypt. The Government of the French Republic, for their part, declare that they will not obstruct the action of Great Britain in that country by asking that a limit of time be fixed for the British occupation or in any other manner . . . .

Article VI reads:

> In order to insure the free passage of the Suez Canal, His Britannic Majesty's Government declare that they adhere to the stipulations of the Treaty of October 29, 1888, and that they agree to their being put in force. The free passage of the Canal being thus guaranteed, the execution of the last sentence of paragraph 1 as well as of paragraph 2 of Article VIII of that Treaty will remain in abeyance.

The last sentence of Article VI constitutes a further exception, but a reference to the subject referred to shows that the matter is unimportant: the principle of Article VIII is conserved, the annual meeting remaining in abeyance, as it has remained since 1888. As for the broad stipulations of the treaty, Great Britain not only declares its adherence, but its agreement to their being put in force. The language is plain and unequivocal, and there is no apparent reason to doubt Great Britain's good faith or impute to her any *arrière pensée*. If the text alone does not carry conviction, it may be worth while to compare the language of its terms with that used by Mr. Curzon in Parliament in reply to an interpellation (see p. 89 above). There it was said of the Constantinople Convention that it "has not been brought into practical operation." In Article VI of the Anglo-French Declaration the British Government

> declare that they adhere to the stipulations of the Treaty of October 29, 1888, and that they agree to their being put into effect.

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[37] London Times, August 9, 1904.

[38] International Law, Oppenheim, Vol. I, p. 587, Appendix.

The Marquess of Lansdowne, in a dispatch to the British Ambassador at Paris dated April 8, 1904, enclosing the draft of the Anglo-French Declaration of the same date, said:

It will be observed that an Article has been inserted in the Agreement declaring the adhesion of His Majesty's Government to the Treaty of the 29th October, 1888, providing for the neutrality of the Suez Canal in time of war. In consequence of the reservations made by Lord Salisbury at the time respecting the special situation of this country during the occupation of Egypt, some doubt existed as to the extent to which Great Britain considered herself bound by the stipulations of the Convention. It appears desirable to dissipate any possible misunderstanding by specifically declaring the adhesion of His Majesty's Government. It is, however, provided that certain executive stipulations which are incompatible with Lord Salisbury's reservations should remain in abeyance during the continuance of the occupation.[20]

The understanding of Great Britain's present attitude toward the Constantinople Convention may be shown by quotations from well-known writers who have written since the Anglo-French Declaration. Holland says:[20]

The free passage of even belligerent war-ships through the Suez Canal is of course specially guaranteed by the Convention of 1888.

Oppenheim says:[21]

But article 6 of the Declaration respecting Egypt and Morocco signed at London on April 8, 1904, by Great Britain and France has done away with this reservation.

Westlake says, after quoting Article VI of the Anglo-French Declaration:[22]

so it is to be expected that the ratifications will be exchanged, if they have not already been so.

This shows the interpretation of three British authorities. The last edition of Bonfils, p. 281, notes the terms of Article VI of the Declaration. Despagnet says:[23]

A la conférence de 1885 et en signant le traité de 1888, l'Angleterre avait fait des réserves en ce qui concernait son droit de disposer du canal pour sauvegarder sa situation en Egypte tant qu'elle occuperait ce pays. Dans son arrangement général du 8 Avril 1904 art. 6 avec la France, elle a renoncé à ces réserves et accepté l'application immédiate du traité de 1888.

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[20] London Times, April 13, 1904; also Parl. Papers, France, No. 1, 1904, Cd. 1952.

[20] Neutral Duties in a Maritime War, p. 2, reprint from the Proceedings of the British Academy, Vol. II, 1905

[21] Int. Law, Vol. II, p. 234, footnote. [22] Int. Law, Part I, pp. 328-9.

[23] Cours de Droit International Public, 1905, pp. 503-4.

Professor Politis, Fellow of the Faculty of Law of the University of Poitiers and Associate of the Institute of International Law, in a discussion of the Declaration concerning Egypt and Morocco, after remarking that the reservations of 1885 and 1887 put the treaty at the mercy of (*à la discrétion de*) Great Britain, which could, according to her interests, permit or refuse its application, says later:[34]

> In fact the freedom of the Canal continues to remain at the mercy of Great Britain.

There can be no doubt of this, considering Great Britain's sea power and her situation in Egypt; but his next words signify what he considers its status in law since the Anglo-French Declaration. He continues:

> Mais on peut dire qu'en droit, le régime du canal se trouve fortifié et mis hors de doute, par la cessation de tout malentendu au sujet du caractère obligatoire de la convention de Constantinople.

Nys does not mention either the reservations or their renunciation, but his work on International Law, though its publication began in 1904, must have been written too early for the latter. Enough has been quoted to show the understanding of well-known continental authors as to the present status of the Constantinople Convention. As has before been stated, there is no sufficient reason to doubt Great Britain's good faith in the Declaration of April 8, 1904. Her supreme interest is in absolute freedom of traffic for her merchant vessels and men-of-war, which the Convention of 1888 guarantees; her understanding with France removes any anxiety about her occupation of Egypt; and it is not difficult to imagine her freedom from care regarding the use of the actual waters of the Canal and its approaches by the warships of any future enemy, situated as she is at Malta and the mouth of the Red Sea.

We may, therefore, regard the Constantinople Convention in full effect. It remains to consider how far the Canal is "neutralized" by that convention, in the sense of the word as developed in Part III. Taking Latané's summary (p. 84) point by point, it appears that:

(1) The Constantinople Convention is a formal act between nine powers of Europe, including all the great European maritime powers, and its terms specify perpetuity; hence it is not revocable

[34] Revue Générale de Droit International Public, tome XI, 1904, p. 697.

at will except by the concurrence of all the signatory powers, or by *force majeure*.

(2) The signatory powers include all the great military powers of Europe. This fact should make the guaranty effective so far as any pact can to which the several nations have pledged their faith.

(3) Fortifications are forbidden (Articles VIII and IX), and Article VII is along the same precautionary line.

(4) There is a limitation of full rights of sovereignty in the mere fact that Turkey expressly surrenders for herself certain rights she would otherwise have as a belligerent, and gives by convention to her possible future enemies certain rights they could only have otherwise by force, in waters lying entirely within her territorial limits; and also in the provisions of Article VIII and Article IX.

(5) The word "always" in Article I, the provisions of Article XV, and the fact that the words "in time of war" occur repeatedly in the instrument, all go to establish a permanent condition, and one brought into complete operation by a state of war.

Considering next Latané's extension of the principle of neutralization to waterways, his first and third points are covered by the existence of the Constantinople Convention itself, the concurrence of many powers being as great a preventive as possible against "the temptation to appropriate them (the Canal) for national purposes." The second point has some application. French writers quite generally say that the Canal is not "neutralized" by the Convention because the passage of belligerent ships is permitted, and Westlake makes a similar remark (Part I, p. 330, footnote). This is undoubtedly true, considering the neutralization of the Canal on a strict parallel with the neutralization of territory. But when the difference between the laws of land warfare and maritime warfare is taken into account, it may safely be said that the Suez Canal is neutralized. Without bad faith no signatory power can appropriate the Canal to its sole use for belligerent purposes, or take steps to forbid the passage of the warships of its enemy; and the combined influence of the signatory powers will doubtless discourage non-signatory powers from any such attempt. Thus the Suez Canal is neutralized although the word "neutralization" does not occur in the Convention of 1888, the idea being conveyed by such terms as

"free and open," "free use," "open in time of war" and "principle of equality," as well as by the prohibitions of the instrument. It is interesting here to note Lord Granville's instructions to the British delegates to the Paris Commission in his dispatch of May 2, 1885:

> In order to prevent future misapprehension as to the views of Her Majesty's Government with regard to the Suez Canal, I have to request you to be careful during the discussion attending the preparation of the draft regulations regarding the canal, to avoid the use of the word "neutrality" as applied to the canal, and to adhere to the term "freedom" or "free navigation," as used in the declaration of the 17th March, and in my circular dispatch of the 3rd January, 1883.

Although the delegates replied to Lord Granville's caution that there would be no danger in the use of the word neutrality

> inasmuch as there has been common accord from the first that the term, as applied to the canal, had reference only to the neutrality which attaches by international law to the territorial waters of a neutral state in which a right of innocent passage for belligerent vessels exists, but no right to permit any act of hostility,

yet his views prevailed in the finished instrument. The question naturally arises whether the growth of sentiment in the succeeding years is sufficient to account for the use of the word "neutralization" in the ratified treaty concluded by Lord Pauncefote with Mr. Hay.

Turning now to that treaty, and applying the same criteria as have been used above, it appears:

(1) There is a formal act of agreement between the United States and Great Britain, and another, hinging on the first, between the United States and Panama: but these are all. In case of war with Great Britain the former treaty would go to the winds.

(2) There is a lack of sufficient number of states, conventionally bound, to make the treaty effective if the United States wishes to abrogate it by notice, or if it is automatically abrogated by war with Great Britain. This is not to say that a coalition *could not force* the United States to take a desired line of action, but simply that no states are pledged to such collective action by treaty engagements.

(3) Fortifications are not forbidden by the treaty, and the circumstances attending the omission of the prohibition from the final draft of the treaty have been noted above. Further, in the

treaty with Panama the United States explicitly reserved the right to fortify, giving an additional notice to the world, if one were needed, as to her attitude regarding this particular right.

(4) There is a limitation of the sovereignty of the territorial power, which by the terms of the treaty with Panama, concluded exactly two years after the Hay-Pauncefote Treaty, descends in some manner to the United States, *so long as the latter treaty stands*. But these limitations are far from going to the extent of those established in the Constantinople Convention. Moreover, by the terms of Panama's treaty with the United States the limitations upon the former's sovereignty are yielded to one nation only, and that a powerful one, which virtually assumes a protectorate of Panama; Egypt, on the other hand, is a suzerainty of Turkey, and not an independent state, and the limitations of sovereignty imposed by the Constantinople Convention are upon Turkey, herself a weak state, and are yielded to all the great states of Europe acting in concert.

(5) The permanency of the treaty as toward Great Britain exists as long as we are at peace with her, and ceases whenever we choose to engage her in war. To other nations, its provisions are simply a declaration of intentions. Beyond equality of treatment no other nation has a right to hold us to an observance of the Rules.

Thus in essential particulars the Hay-Pauncefote Treaty does not, and can not, establish "neutralization." Using the word, the treaty fails to secure the fact in any exact sense, in which it is precisely the reverse of the Convention of 1888. It is unfortunate that the word should have been used at all, and it is regrettable that the distinguished American negotiator did not, both in this treaty and the later one with Panama, take his guide from Lord Granville's letter of instructions in 1885 to the delegates to the Paris Commission. The reason why the British negotiator allowed the use of the word is not difficult to see. But with or without the word, the Hay-Pauncefote Treaty does not establish the neutralization of the Panama Canal.

Reviewing this phase of the question before us it is evident that the status of the Suez Canal as regards neutralization does not furnish any real precedent for that of the Panama Canal. The former status rests upon a convention that is international in the broad sense of being subscribed to by a sufficient number of

powerful states to enforce its provisions against the world, and a convention in which the rules governing neutralization are declared by those states jointly. The latter status rests upon the provisions of the Hay-Pauncefote Treaty (upon which the treaty with Panama hinges), which is international only in the narrow sense that more than one nation is a signatory power. Moreover, even in that treaty the language is: "The United States adopts . . . ." It only remains to add that the Constantinople Rules were not adopted until nearly twenty years after the opening of the Suez Canal, during which its free use for navigation gave to the users a sort of prescriptive interest that had its great effect during the formulation of the Rules; the Rules for the use of the Panama Canal will not go into effect for a decade to come.

V.

In the summer of 1906 the writer was much impressed by a remark made by a gentleman whose long and distinguished public service entitles his words to great respect. He said, in effect, that in reality there is no such thing between nations as friendship, beyond the limits of self-interest. Within a twelve-month another gentleman of similar long and distinguished public service said the same thing, and in almost the same words, in a public speech. To one who heard both, the language was so much alike as to be startling. The idea expressed is, of course, at the bottom of our reason for the maintenance of national military forces, but it is rarely heard in such concrete expression; and if appreciated at all, it is not fully realized by those who, on the one hand, hope to secure peace by conventions, or, on the other, rely for the maintenance of our prestige and national safety upon our potential strength, or worse yet upon bombast, which is the daughter of ignorance. The recent humiliation of Russia has given ample evidence of the insufficiency of potential strength, and of the danger that lies in a contempt of the adversary based upon ignorance.

The United States has acquired—for herself alone—far-reaching rights in Panama. By that very fact she has assumed single-handed equally far-reaching obligations, for rights entail obligations. One of these obligations is the protection of the Canal, and the question must be met how that protection is to be extended. Were the Canal really neutralized, its protection might be held to

lie in the moral force exerted by a union of powerful states bound together to maintain its neutralization. But it has been pointed out that the United States is the sole sponsor for the Canal, and the contention is made that the Canal is, therefore, not neutralized. If that contention be admitted it has a great bearing on the protection of the Canal. How shall we maintain our rights there, or discharge our obligations, if some powerful nation shall feel strong enough to gainsay our pretensions at a future day? There is no answer apparent, consistent with our attitude, that leaves out military force.

This again leads to other questions. In what form shall military force be manifested? Shall the defense of the Canal be a navy function, or an army function, or shall it devolve upon both services? Shall there be permanent fortifications? It has been held in some quarters that no permanent fortifications are needed for the defense of the Canal, which will be sufficiently guaranteed by the navy. To the mind of the writer this is a grievous error; he firmly believes that no complete defense of the Canal is possible that leaves out either service, but that the defense of the Canal is primarily an army function and only incidentally a navy function, and that permanent fortifications are a necessity. Not to have permanent fortifications at the Canal will operate to tie the navy to the Canal region in war, and that will mean partial paralysis. The navy must be free to go where it can do the most good, and without any drag upon its freedom of action due to a knowledge that in going it may have to leave open vital interests dependent upon it alone. The Canal zone needs permanent fortifications just as truly as does New York City. With them, if the navy be near, it will add greatly to the defense; but if the best interests of the country call it far away the Canal will still be amply protected.

The attitude of the United States toward other nations is one of saying virtually: "Hands off! The Canal is the affair of this nation alone." If the Canal zone be unfortified and ungarrisoned, that attitude is merely bluff. It is the writer's conviction that the United States will fail in its manifest duty if it neglects to fortify the Canal.[25]

[25] It may be added in this connection that the United States guarantees the independence of Panama, though no mention of the bearing of this guarantee on the question of fortification was made in the original paper.—H. S. K.

VI.

In what precedes certain facts have been presented and certain opinions advanced regarding the status of the Panama Canal. In conclusion the principal of these are summarized as follows:

The facts are:

(1) The Canal is owned by the United States Government, as permitted by the Hay-Pauncefote Treaty. There is no company, there are no shares, and hence no foreign government or citizen has any vested property rights in the Canal, the treaty rights guaranteed to Panama alone excepted.

(2) The "construction, maintenance, operation, sanitation and protection" of the Canal belong exclusively to the United States Government.

(3) Commercial freedom of transit is guaranteed. That transit in time of war in included is evident from the Rules relating to belligerents.

(4) Free transit of vessels of war is guaranteed. That transit in time of war is included is evident from the Rules relating to belligerents.

(5) By implication, due to the absence of prohibitions in the Hay-Pauncefote Treaty, the United States has the right to fortify the Canal. By specific stipulation in the Hay-Bunau-Varilla Treaty she has that right, and in that stipulation has proclaimed her belief that the right exists. Further, this right is affirmed by the so-called Spooner Act of June 28, 1902, which, though a domestic law, is open to be read by the world.

The opinions are:

(1) The Canal is not neutralized in any proper sense of the word.

(2) The free transit of vessels of war in time of war can not be held to apply to enemies of the United States when the United States is a party to the war. If Great Britain should ever become hostile, the treaty establishing the Rules would be suspended by the existence of war; with other possible maritime enemies the United States has no treaty.

(3) It is the duty of the United States to erect and garrison permanent defenses for the protection of the Canal.

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U. S. NAVAL INSTITUTE, ANNAPOLIS, MD.

NAVAL TRAINING. II.

By REAR-ADMIRAL S. B. LUCE, U. S. Navy.

INTRODUCTION.

In an article entitled, "The Manning of our Navy and Mercantile Marine," which appeared in the UNITED STATES NAVAL INSTITUTE, Vol. I, No. 1, 1874, an attempt was made to show the advantages of industrial training in general, and its application to the naval service in particular. This was followed by the article "Naval Training," NAVAL INSTITUTE, March 1, 1890, on the same general lines. In the meantime the Navy Department had issued General Order of April 8, 1875, under the operation of which the late training system was evolved.

The training service culminated in the training squadron of 1883. Notwithstanding the years of labor devoted to bringing it up to a high point of efficiency, that service has now "melted into thin air . . . . and . . . . left not a rack behind." After a lapse of thirty-five years the attention of the naval profession is once more invited to the great importance of industrial training and its close application to all branches of the enlisted personnel of the navy: to the artificer of the engineer's department, as well as to the man on deck.

Familiar as this subject is to the profession at large, attention may be called to two points. In those naval powers where the law of conscription is enforced, as in Germany, France and other countries, the navy is enabled at all times to secure its quota of seamen from the merchant service and from the deep-sea fisheries. The United States has no such law—no such nurseries of seamen. Secondly, countries having a large mercantile marine would find, in time of war, their naval reserves in that service. There has never been a time in English naval history when the merchant service of

that country has failed to supply ships and men for the national defence. The United States has no mercantile marine. Hence it is the plainest of plain propositions that the navy of the United States must produce its own seamen, in order that every ship may carry a certain percentage of that class, say 25 per cent of its complement, exclusive of the engineer's force.

To the unthinking the very name "seaman" is inseparably associated with the seaman of 1812, and carronades and long 18's. The seaman of 1812, be it understood, besides being an able seaman who could "hand, reef and steer," was also an expert marine artillerist.[1] The naval successes won in those days were largely due to his good gunnery, his straight shooting. Time has wrought great changes in the gun, but not in the gunner. Science and art have combined to bring naval ordnance and gunnery up to the highest state of efficiency; but, strange to say, the production of the gunner, or gun-pointer as he is called, has been left to chance. The admirable target practice of the present day is readily conceded. But the up-to-date marine artillerist should be, as of old, something more than an expert at his gun; he must be, now, as then, a seaman also; but a seaman who has advanced with all the rest of the world in education and training. Military training has become an indispensable part of his make-up and a course in mechanics is necessary to the understanding of the mechanism of his gun and its appliances, whether it be a rapid-firer or a 14-inch gun. A course of instruction covering these and cognate subjects requires time. It should be progressive, and must be thorough at each successive step. To attain this great end the course must begin in early youth and the term of enlistment must be materially extended, as we shall endeavor to show.

The report of the chief of the Bureau of Navigation of November 1, 1908, invites some reflections on our method of manning the navy. Under the head of desertion, for example, it is stated, page 30, that the number of deserters for the fiscal year ending June 30, 1908, was 5036; the enlisted strength allowed (though not quite full) up to May 13, 1908, being 38,500 (page 24). The report goes on to say: "A certain proportion of desertions may

[1] The word artillery is used here in its original sense to denote all implements of projectile warfare.

always be expected . . . . this proportion may be reduced in two ways: first, by making the service more attractive" (which has already been done to a very liberal extent); "and, secondly, by increasing the penalties for desertion." It may be observed in passing that punishment, even to the extent of hanging and shooting, cannot be depended upon as a deterrent from crime. There is a third method of reducing the proportion of desertions, more efficacious than the increasing of penalties. This latter method will be fully explained as we proceed. Suffice to say here that it is the *method of naturalizing youths to ship life during their formative period; teaching them, from the start, that the ship is to be their home.*

Again, referring to the same report, it is stated that the number of men serving under their first enlistment is 29,734; second enlistment, 5862; third enlistment, 1642, etc.

Taken together, the number of desertions and the comparatively few enlisted men who remain in the service,[2] the exhibit is proof that our method of manning the navy is susceptible of improvement. What is the method?

For our present purpose we may divide the personnel of the navy into three principal classes: the commissioned officers, the warranted officers and the enlisted force. The commissioned officer follows a profession; the enlisted man follows a trade.[3] To qualify for the naval profession, young gentlemen already well grounded in English studies attend a technical college known as the Naval Academy. Here, in addition to a military training, they pass through an academic course which, for thoroughness and extent, compares favorably with that of our oldest universities. The course lasts four years. On graduating the young officer enters the profession of his choice for life. With the enlisted force the conditions are totally different. Of this force we are to consider, for the present, the seaman class only. Youths and young men between the ages of 17 and 25 years are enlisted for four years. If under 18 years the recruit must sign an agreement to serve until 21 years of age. As the former training service has been

[2] Later returns show a decided improvement in these respects.

[3] NAVAL INSTITUTE, No. 121, the naval recruit is spoken of as "entering a profession." This confusion of ideas, confounding a profession with a trade, is largely accountable for all our naval training being conducted on shore, instead of afloat.

discontinued, we have in its stead fine recruiting stations where recruits are kept four months, when they are drafted to seagoing ships.

The recruit, while at the recruiting station, is rated as an apprentice-seaman. When transferred to the general service he loses his identity as such. He then mingles with the ship's company, and is left very much to his own devices to get along as well as he can. No one need be told how very little can be accomplished in the way of instruction of any kind in four months. This is particularly true when the recruit is suddenly introduced into a life and surroundings totally different from anything he had ever experienced, or even dreamed of, and radically different from the environment of the ship which is soon to be his home.

In barracks, or in camp, the recruit (formerly known as a landsman) is well cared for, as he should be. He is well paid and comfortably housed, well fed, well clothed and gets enough exercise in the way of drills to keep him in good health. The quarters are ample, affording plenty of elbow room and abundance of light; the discipline is mild; recreation is well provided for. It has been shown, however, that barracks, with all the advantages claimed for them, can be improved upon. The camp, according to one writer, has superior advantages. An officer closely identified with the training of landsmen and who has given much intelligent consideration to the subject strongly advocates putting the men in tents. "Statistics," he writes, "show that there has been little or no sickness since the apprentice-seamen have been quartered under canvas; whereas in barracks there were always the usual diseases, incident to the living together of a great number of men." "To my mind," he adds, "the camp is ideal for the training station located in a temperate climate." The writer fails to explain how far camp life prepares landsmen for ship life—the great desideratum.

Says the Massachusetts Industrial Commission: "The efficiency of an industrial school depends on its leading motive. Each trade school should have a distinct industrial idea." How far this sound principle is carried out in the barracks, or the camp life, for prospective seamen, we leave others to judge. The writer goes on to say: "Considering the battleship to be the proper training ship, the hearty co-operation of the fleet with the training service should find good results." (Method employed at Training Sta-

tions, page 151.) As there does not appear to be any such "co-operation" on the part of the fleet, the whole theory of our present system is based on a fallacy.[4]

As the number of commissioned officers available for service at the so-called training stations is very limited, the drilling and instructing of the recruits must necessarily devolve upon warranted officers and petty officers. This duty is well performed, according to the light of the instructors. In one of our several attempts to establish a normal school for petty officers it was found that many seamen petty officers knew absolutely nothing of knotting and splicing, the a b c of a seaman's trade.[5]

However that may be, it is a subject of general remark how very much is accomplished in this direction—the setting-up drills, the school of the soldier, etc.—in the short time allowed, often less than four months. The question now to be considered is how far this four months' course of instruction in barracks or in tents, thorough as it undoubtedly is, prepares a landsman or youth for his trade—that of seaman—and for his career—a life on board a ship of war. The answer is that there is little pretense to fit him for the trade of seaman and that the life in barracks, or in a camp, actually unfits him for ship life.

If it be contended that the navy has no further use for seamen, then the term apprentice-seaman is a misnomer and misleading and should be dropped; and if it should be claimed that when the pressure for recruits is relieved more time may be given to barracks or camp life, the answer is that the longer the recruits are kept in barracks, or in a camp, the more do they become unfitted for life on board ship. In short, to put the recruits in barracks, or in tents, is to begin their career by a false step and one which cannot easily be retrieved.

[4] This statement is subject to modification. Some officers recently from sea say that the ship's daily routine does not admit of time for special attention to the raw recruits from the recruiting stations; while others say the contrary is the case. (See G. O. No. 284, Jan. 7, 1882.)

[5] See, in this connection, Navy Department General Order, No. 272, of June 28, 1881. The object of this order was to establish, under the name of a gunnery school, a normal school for petty officers. These two General Orders (Nos. 272 and 284) were issued by the Navy Department twenty-seven years ago. Neither order was ever carried out. There was no executive officer in the department to see that the Secretary's orders were executed.

Put the seamen, those who have become habituated to ship life, in barracks, by all means. Substitute barracks for the old *Guardo* (the name applied by sailors to the receiving ship): but for the young recruit there is but one first step, and that is, from his home to the deck of a man-of-war fitted up as a school ship.

THE APPRENTICE-SEAMAN.

From all that can be learned the three or four months spent in camp, or in barracks, has done little to prepare the apprentice-seaman for duty on board ship. The few advantages claimed for shore training are greatly overbalanced by the many and very serious disadvantages. First, and before all, is the fact that it disqualifies the recruit for life on board ship. The net results prove this by the number of desertions and the comparatively few re-enlistments.

A system of naval training that does not recognize the prime necessity of reconciling the recruit to ship life from the very beginning, fails in its most essential requisite. Whatever advantages may be claimed for a given system, if it does not naturalize the recruit to the ship it does not fulfill the very objects and aims of naval training. For it is by means of making the young seaman regard the ship as his natural home that the great majority of the enlisted force may be retained in the service, and thus save that force from being depleted by desertions and failures to re-enlist. To accomplish this end the recruit must be taken while young and put at once on board ship. This is axiomatic. It cannot be gainsaid.

How Not To Do It.—Youths and young men are enlisted in the navy presumably to learn a trade—that of up-to-date seamen—bearing in mind now the seaman class only. Their introduction into the service is not on board ship where that trade can best be learned, but in barracks or tents where the quarters are roomy and well ventilated and well lighted. Here every comfort is provided for, as already stated. The drills, mostly in the manual of arms, the school of the soldier and the school of the battalion, are far from fatiguing, but there are few signs of the seaman's trade. There is no time for it. Field sports are encouraged, and the evening hours are rendered pleasant in various ways. Suddenly they are drafted to a vessel of war. Here the recruit finds himself in an entirely new world and one for which he is totally un-

prepared. To him it is a world of unutterable confusion, where everything is new and strange. He finds it difficult to adjust himself to such unlooked for conditions. It is long before he gets into correspondence with his environment and most recruits of mature age, fixed habits and social affiliations never can adjust themselves to ship life; hence desertions and failures to re-enlist. The restraints, the confinement, the discipline and the undeviating routine are found to be too irksome to be borne by one past the formative age. Twenty or twenty-one years of perfect freedom on shore—freedom from restraints of any kind, a stranger to methodical habits and without a trade—all these conditions have rendered the average young man unsuited to become a member of a ship's company with any prospect of future usefulness. The Chief of the Bureau of Navigation, in his report already quoted, observes that "a certain proportion of desertions may always be expected, due to the discomforts and deprivations incident to a sea going life, the virtual severance of all family ties, and the drifting habit peculiar to the young and ambitious, who form so large a proportion of our enlisted force." That is quite true. The remedy is to catch them while young and inure them to ship life from the first.

What Class of Landsmen Are We Enlisting?—This question introduces another and a very important phase of the subject. The American system of public schools has long been our boast. Fourth-of-July orators never tire of telling us how highly educated we all are, and how every American boy may be President of the United States. For some time past it has been dawning on the public mind that this is a delusion; that much of our boasted education is misdirected education, and that a great deal of such misdirected education is positively harmful in itself and prejudicial to the public good. "Thousands are starving in all the professions," observes one writer, "who should be on farms like their ancestors; the failures have muscles for mechanical work; but not brains for intellectual labors." Many a first-class mechanic has been spoiled to make a very poor and perfectly useless college or high school graduate. The criminal classes are largely recruited from these unfortunates whose education has been misdirected.

Mr. Paul H. Hanus, chairman of the Massachusetts Commission on Industrial Education, in an address January 9, 1908, says: "The statute under which the Commission on Industrial Educa-

tion has been carrying on its work commits the State of Massachusetts to a distinct policy in industrial education; namely, that such education shall be given in schools supported by public funds, but independent of the existing public schools. The importance of this policy deserves emphasis. It is nothing more nor less than the establishment of a new kind of public education on a foundation as secure as that of the existing public schools, but with a different leading motive. It means the establishment of schools for *vocational training* as such, as distinct from the existing public schools, the purpose of which is general education. The dominant motive of the schools to be established under the Commission on Industrial Education is, therefore, preparation for a vocation, while the dominant motive of the existing public schools is general culture. *It is important to bear this distinction in mind, inasmuch as the leading motive of a school is the most important factor in determining its efficiency. On it will depend the scope and nature of the work done in the school, the qualifications of the teaching force, and the character of the results which the school achieves.*" This is particularly applicable to our so-called naval training service.

"To prevent misunderstanding, it should be pointed out that, although the emphasis in this discussion is on vocational education, such emphasis neither ignores nor in any sense disparages the value of general education. In this country *all* education, if well done, is valuable. We have profited much by the system of education hitherto developed, and we shall continue to profit by it. Nevertheless, *this education is inadequate.*" That fact: "inadequate education," is what the people of this country are waking up to, and one which the navy must wake up to.

"One of the most important principles on which our democratic institutions are based is, equal opportunities for all through education and through equal rights before the law. In this country every youth should have the opportunity to make the most of himself, and to lift himself to any social level to which he may aspire, and to which his character, capacity and industry may enable him to attain. Yet the school system which has been devised to guarantee this right *now fails to reach the great majority of our population after they reach the age of 14 years.*" Let those interested in the training of our seamen branch and engine-room artificers branch make a note of this.

"The question which we have to answer is: What becomes of this great majority who leave school at an early age? The investigations of the Commission on Industrial and Technical Education showed that there is in Massachusetts alone probably not less than 25,000 of these young people; that these young people are engaged in various kinds of juvenile occupations, in which they have no opportunity to apply what they have learned. Accordingly, they forget most of what they have learned in school, and by the time they are young men on the threshold of citizenship, they are sometimes actually *more ignorant than they were when they left school.* The situation, however, is even worse. Not only has their educational development been arrested, but the unfortunate education of shifting experience and environment has failed to develop in most of them the characteristics of substantial manhood." This is the class that enlist into the navy, and by some occult process become "the finest seamen in the world."

"Again these young people have an earning capacity but little above that which they had when they left school. They have not learned what it is to become adapted to a given employment; or to make progress in efficiency in a given kind of work. In other words, they find themselves without a career at an age when the answer to the question '*What shall I do?*' should have been settled, and when their usefulness in their several careers should begin to open to them the promise of increasing earnings." As the question "*What shall I do?*" has not been answered by many, they enter the navy as a forlorn hope, a hope seldom realized.

"Is is clear, therefore, from what has just been said, that our provision for public education *fails* to reach the great majority of our population during the critical period of youth. During these important years, when the boy rapidly becomes a man, when the influences to which he is subject are likely to be permanent, during those years the beneficent influence of the education he has received is too often, under present conditions, likely to be dissipated, and to be replaced by the untoward educational influences of shifting environment.

"And this is because there is no school that appeals to a large proportion of our pupils and parents; no school that, by its very nature, suggests the possibility of a career in some skilled pursuit. He therefore naturally takes advantage of the first oppor-

tunity to work for wages that presents itself to him, and that opportunity usually leaves him *stranded at the age of eighteen or nineteen among the hosts of the unskilled.*"

It is at this age, and under these conditions, that the "stranded" young man readily responds to the appeal of the naval recruiting officer. Here at last is the answer to his question: "What shall I do?" Here is a chance to learn a trade, and at the same time to have an opportunity of seeing the world. He gladly enlists only to find in many cases that he is not suited to the confinement and the restraints of ship life. This explanation does not cover all cases surely, but certainly a great many. And it traces one of the causes of desertion home to its source. Desertions and failures to re-enlist are the logical results of our present method of manning the navy.

The report of the Commission goes on to say: "Boys from fourteen to sixteen must turn their attention to the juvenile occupations in which the prospect of an upward career is impossible. By the time they are eighteen or nineteen years of age many of them *are lost to the skilled occupations altogether.*" Let naval educators take note of this.

To sum up: "1. Our present provision for public education is inadequate. Its dominant aim is general culture; but it makes no *provision for training for specific usefulness in some skilled vocation* for those who must leave school when fourteen or fifteen years old, and who, therefore, must face at an early age the momentous question, 'What shall I do to insure early self-support and progressive well-being as I grow older?'

"2. The progressive development of all high-grade industries requires skilled workmen, possessing industrial intelligence; that is, comprehensive insight into, and intelligent interest in, their several trades (including that of seamen), as well as skill." This applies equally to ship's artificers of the engineer's department.

"3. The present conditions of production are unfavorable to the training of such workmen, or naval apprentices, in the shop or on board a battleship, and sometimes render such training impossible.

"4. All industries, whatever their grade, demand more men than are now obtainable who are capable of acting as foremen, superintendents, managers, petty officers or machinists—men possessing the comprehensive insight, interest and skill necessary for

the organization and direction of a department, a shop or his station on board ship, either on deck or in the engine room.[8]

"5. Such men, whether workers, foremen, superintendents, petty officers, gun-pointers or artificers, are now usually developed by chance; and they are then self-made men, possessing the merit, but also the conspicuous shortcomings due to their lack of early training. Does the gun-pointer, 'by chance,' fulfill modern conditions?

"6. Meanwhile, boys and young men are not only *not* directed toward the trades in our existing schools, but are often actually directed away *from them* by the bookish education of those schools and their purely academic traditions. Manual training, be it understood, is not industrial training, and should not be confused with it. Manual training is, if well done, a general acquaintance with constructive and productive activities. It may make a pupil generally *handy* and hence may serve as preparation for industrial training. But it goes no farther. Industrial training, on the other hand, means vocational training, training in trades (and for the navy). It aims to develop industrial intelligence and skill in particular vocations. It does not properly begin until the pupil is at least fourteen years old. It does not make a journeyman, a seaman or a machinist, but it gives each worker at a skilled vocation a training that enables him to earn a living wage at eighteen or nineteen, and that gives promise of increasing efficiency (as a seaman or machinist) as time goes on.

"7. Boys are not wanted in the industries until they are sixteen years of age. The result is an army of youths from fourteen to sixteen years of age, most of whom are either at work in various kinds of juvenile occupation in which they learn no trade, are subject to little, if any, beneficial general education, and often to much harmful education from evil associations." It is this class, from fourteen to sixteen, who should be put on board training ships.

"8. These years and subsequent years are, however, valuable for industrial education. But there has been no agency (not even in the navy now) whereby this education is provided, save to a very limited extent.

[8] Apologies are offered to the Massachusetts Commissioners on Industrial Education for these frequent interpolations of their admirable report.—S. B. L.

"9. Hence the need of industrial schools to meet a new educational need which has evolved with the evolution of our industries (and naval expansion)." Such schools should receive pupils fourteen or fifteen years of age who declare their intention (to enter the navy in order) to learn a trade (the trade of seaman or machinist). "Such schools should be independent schools, because their leading motive is vocational training and not general culture, and the efficiency of a school depends on its leading motive.

"10. Such schools should offer a course of training covering four years of instruction on shore," and from one to two years on board training ships.

"Trade instruction should be given in schools devoted to particular trades. Each school should have a distinct and unmistakable character as the exponent of a distinct industrial idea," whether on shore or in the navy.

What was true in Massachusetts was found to be true in other States of the Union, as well as in Europe, and is equally true in the United States Navy, viz: *that industrial training has become a necessity.*

Said Mr. Edwin G. Cooley, formerly superintendent of the Chicago public schools: "It has come to pass that we are educating about two million boys for the Presidency, and about thirty million for nothing, because our schools are cramming things into their heads which will be of no use to them when they begin work in the factory or on the farm." And Mr. Lorenzo D. Harvey, president of the National Education Association, in his annual address, July 6, stated that: "Within recent years there has sprung up a widespread demand for industrial education. It comes from all parts of the United States and from all classes of people—the manufacturer, the professional man, the man engaged in commercial enterprises, the farmer, the educator. Industrial education has probably a different meaning for each of these types of individuals, and yet all agree upon one thing, and that is that it is something not found in any adequate form in our present educational system.

"To the farmer industrial education means education that will fit the boy to become a more effective farmer and that will present inducements to him to remain upon the farm; to the manufacturer it means training that will give him skilled workmen and more

efficient foremen and superintendents."[1] To this let it be added that to the navy it means that it will fit boys to make a higher type of man-of-war's man, better all-around gun-pointers, superior turret captains, more competent artificers of all kinds, and, eventually, more thoroughly trained petty officers, more highly educated warrant officers. Furthermore it means that it will hold out such inducements that our young seamen and artificers will find it to their best interests to remain in the service as "continuous-service men."

How To Do It.—The age of enlistment in the navy is from seventeen to twenty-five years. The plea is here made for the conservation of a vast amount of valuable raw material now going to waste, viz: the hundreds of bright boys from fourteen to seventeen years now in the streets, or on farms, who would gladly enlist were they permitted by our regulations to do so. The manning of the navy, wholly and entirely, from these boys is out of the question. But as there are so many trades represented on board ship, the proposition is simply to add to the number the trade of an up-to-date seaman. And as there are, in every ship's company, a proportion (say 25 per cent) of the seaman class, or deck hands, who are not specialists, or whose duties do not call for any great amount of previous training, the proposition is to convert that class of negative characters into a highly trained class of specialists as seamen, *up-to-date seamen*, who will become in reality, as well as in name, "*seamen-gunners.*" We will guarantee that boys who shall have been two years under proper naval training will furnish as large a proportion of good gun-pointers as the same number of boys who are now passing those two years on farms or on the streets of a city. And what is true of the seamen branch is equally true of the engine-room artificers branch. The industrial school system applies to each equally.

The training of boys for the naval service, as established by the

[1] See very illuminating report of the National Educational Association Convention, Denver, Colo., July 6, 1909.

This whole question was fully discussed from the naval point of view thirty-five years ago. See PROCEEDINGS OF NAVAL INSTITUTE, Vol. I, No. 1, 1874. It is difficult to understand why practical, progressive America, with its boasted public schools, should permit itself to fall fifty years behind Europe in the matter of industrial education. Still more difficult is it to understand why the United States Navy should have deliberately abandoned that system after proving its great value.

order of the Navy Department of April 8, 1875, although a marked success during its prime, has been abolished. The breaking up and total abandonment of what was commonly called the "training system," which was essentially the industrial method, was due to several contributory causes, the principal ones being the war with Spain, the sudden and great expansion of the navy and the consequent demand for more men to man our ships. The naval apprentice of the average age of sixteen years was too immature to be sent to a battleship. His place was taken by the landsman of twenty or twenty-one years of age, caught up from all parts of the country. The exigencies of the service, it was argued, did not admit of waiting for the apprentice boy to mature.

The pressure for men being now somewhat relaxed, it is a good time to consider how far the navy should revive the training system of 1875 and avail itself of the method of industrial training which has awakened so much active interest throughout this country, and long been known and practiced in Europe. Reduced to its simplest terms the question is: Which is the more desirable man on board ship—the one who has been two years on a farm or the one who has been two years under naval training?—the one who, from fifteen to seventeen years of age, is vainly seeking for a vocation on shore; or the one who, from fifteen to seventeen years, has found his vocation on board ship and has become inured to it? There can be but one answer and that is in favor of industrial education.

The next question is: Which of the two seamen-apprentices gives most promise of usefulness on board ship—the one who has spent four months in barracks or under a tent, or the one who has spent the same time on board a school ship, such, let us say, as a vessel of the *Indiana* class? There is nothing taught in barracks, or in a camp, that cannot be taught just as well, or even better, on board a school ship, with the additional advantage that every day spent on board ship tends to reconcile the recruit to his novel surroundings afloat. The intermediate step of the barracks, or camp, cannot be otherwise than a positive detriment. Every day spent there tends to unfit the recruit for ship life, and thus defeat one of the principal ends in view.

In the industrial system of education the boy of fifteen or sixteen is put in the shop and taught to handle the tools he is to use in his trade. Applying that rule to the naval apprentice he should

be put at once on board ship, his shop, and taught to handle the tools he is to use in his trade; marlinspike seamanship, the compass, the lead, the wheel, small arms, the secondary battery, signalling, electricity and the rest of it, just as it is done on board ship —not by the installation as found on shore. One of the most important features of the training of naval recruits is the inculcation of habits of personal cleanliness—easy enough at fourteen, difficult at twenty-one. Daily ablutions, frequent bathing, the washing and mending of one's own clothes, the frequent inspection, by divisional officers, of the clothes-bags and bedding of the recruits, the mess formations and messing arrangements generally—all this should follow the practice of seamen on board ship, not as done by soldiers on shore. Taken early, life on board ship, "that little warlike world within," with all its privations, soon becomes to him a second nature.

It has been stated that the recruiting stations have supplied more than 80 per cent of all the coal passers required for the fleet. It is submitted that the training of that class of enlisted men could be accomplished far better on board a school ship. The same may be predicated of commissary stewards, cooks and bakers. It is essential to their usefulness, and to their retention in the service, that they should be taught the method of their calling as it is practised on board ship and not as it is done on shore. There cannot be two intelligent opinions on this point. Common sense should teach us that. Moreover, the setting-up drills, the school of the soldier, and the rest of it, all very essential in their several ways, could be carried on just as well on board ship, up to a certain point, when landing parties, for the "school of the company" target practice and the enforced use of boats would be in order.

Of two ships of the same class, such as the *Indiana*, which one is likely to produce the better results—the one moored in the stream or the one tied up to a wharf? There is but one answer—the one moored in the stream. Why? Everyone who has had experience on board a ship at a navy yard knows the demoralizing influence of too close contact with the shore.* The standard argument in favor of the pernicious practice of tying a school ship up to a wharf is the facility it affords for landing the apprentice boys for infantry drill, as if that were the sole object and end of all naval

*Officers serving on board ships in the stream, on harbor service, should have three-quarters of their time allowed as sea service.

training. The fact that under such conditions the boats become of little use the great part of the year is overlooked. Landing in boats with arms and accoutrements for infantry drill and target firing is one of the most important parts of the exercises. The ship in stream, moreover, gives a certain sense of isolation which is increased by the knowledge that the boat, or swimming, is the only means of getting on shore. This early habituation to ship life during the formative period of youth is one of the most important factors in naval training. This fact cannot be repeated too often nor too earnestly. Moreover, it is one that has been completely ignored.

Again: Of two ships assigned to the training service which one promises the better results—the stationary school ship moored in the stream for the reception and breaking in of boy recruits, or the sailing ship that cruises in foreign waters with a crew made up mostly of apprentice boys? On the completion of the "breaking in" process the sailing ship undoubtedly, for it is clear that a boy who has been, from sixteen to seventeen years of age, at sea in a sailing ship, is far more desirable on board a battleship than a boy who, from sixteen to seventeen years, has been on a farm or roaming about the streets of a city, hoping for something to turn up. Other things being equal, he is far more likely to become a good gun-pointer.

It may be mentioned in this connection that the White Star Line has put in commission the full-rigged clipper ship *Mersey*, of 1829 tons (about the size of the *Cumberland*), for the special purpose of training the cadets who are, in time, to command the company's great ocean liners. That company knows what it is about! The great merit of the sailing ship is that it is the best school for young officers as well as young seamen.

Granting all that can be claimed for barracks and for the camp in the way of preparing landsmen for the vocation of seamen, it cannot be denied that the method fails in certain essentials. It does not develop what is called character. One of the results of any system deserving the name of training is to impart an increase of steadiness of nerve. With this comes endurance under conditions the most trying and, in the presence of imminent danger, a coolness and self-possession impossible with the untrained man. No surprise, however sudden, can catch the trained man off his guard. In battle or in time of disaster at sea, men of such a type

would prove invaluable. That special training can be accomplished by the sailing ship better than by any other means. Those who regard the handling of spars and sails of a sailing ship, in all weather at sea, as merely gymnastic exercises such as furnished by Indian clubs, dumb-bells and the like, can have given little or no attention to the subject. Exercising in the best equipped gymnasium is spiritless and *ennuyant*. It develops the muscles, but has no effect upon the brain. It lacks the element of danger. The sailing ship does far, very far, more. Constantly confronting dangers in their work aloft develops qualities which go to the formation of character in the youthful sailor, such as no other form of exercise can. It not only develops the muscular system, but it stimulates the mental and moral faculties as well. To inculcate habits of discipline, which compels self-control; to enforce prompt obedience; to encourage endurance under circumstances the most trying; and to develop a cool contempt of danger in any form, are among the ends sought in naval training. The sailing ship and the school of the topman go far towards securing those ends. Shall we forever discard that invaluable part of the naval training of boys in favor of the farm, or the streets of the city? Bear in mind that we are now dealing with the subject of boys under seventeen years of age who are now excluded from our training ships.* Men so trained from their youth up are less likely to desert and far more likely to re-enlist.

To the objection that we cannot wait for apprentice boys of fifteen or sixteen to mature, the answer is: Don't!—don't wait for the boys on board the training ships to mature. Keep right on enlisting landsmen, as at present, and fill up the complements of ships with raw recruits. They have amply proved their worth as many officers have testified. Then in a very few years the trained seaman-apprentice of nineteen or twenty years of age will be coming along and taking his place in the general service, and seagoing officers will be glad to have him, just as seagoing officers were glad to have naval apprentices when the training service was in its prime. Desertions will then decrease, the number of continuous-service men will increase and we will soon have a new school of petty officers.

What is proposed is simply a return to the training system

*For further discussion of this subject see "Naval Training," the School of the Topman, page 370. NAVAL INSTITUTE, March 1, 1890.

established by the Navy Department in 1875, which was the industrial system. It was based on sound principles, as has been amply demonstrated. It was eminently successful. Let it be resumed. It would give far greater promise than the present crude method of supplying the navy with gun-pointers, turret captains, seamen and seamen petty officers generally. To deny this is to deny the advantages of all education, either industrial or general.

This plea for the training of the seamen branch of the navy is urged in favor of the engine-room artificers branch as well.

The most perplexing phase of the subject of "continuous-service men" remains to be considered. It is the question of pay. A young man of average ability may, during a four years' enlistment, pick up a fairly good knowledge of some one of the many trades practised on board a vessel of war. When paid off with an honorable discharge at the end of his enlistment, he will find no difficulty in obtaining employment on shore at a much higher wage than he can earn in the navy. The "big" discharge, as it is called, will always ensure to its possessor employment in civil life. Then why stay in the navy? The answer is, or should be: "Because I have been brought up to ship life from early boyhood, and would feel out of place elsewhere; while in the navy I have always something to look forward to in the way of advancement and finally a pension."

The following extract from a letter of an "ex-man-of-war's man," which appeared recently (August, 1909) in the *New York Times*, indicates that the navy is educating young men for civil pursuits. It is an answer to a published complaint that the "fleet means $200,000,000 stolen from wage-earners."

"That the fleet means $200,000,000 stolen from wage-earners will not appeal to the average intelligence. The price of the ships came from the property owners of the country, at the lowest tax rate in the civilized world. It was paid in order that there should be funds to enable the government to adequately protect its citizens. As for 15,000 young men, 'turned from productive industry'—well, the navy requires electricians, telegraphers, carpenters, plumbers, machinists, engineers, coppersmiths, boilermakers, clerks, fifty-nine trades in all, and it educates boys to fulfill these duties! I know whereof I speak. I learned my trade in the navy, was honorably discharged two years ago, having saved $800 in my four years, and I am now on a salary of $3200 per an-

num. The navy taught me all I know of 'productive industry.' Without complaints like this one of Mr. Mendes, many young men now drifting along tradeless would do as I have done, and after a four years' education enter business life ashore, fit, sound in mind and body, and with a love for the flag which is beyond the comprehension of the 'free-born Americans' who object to anything military."

The theory that young men, educated by the navy for civil life, will, in time, form a great naval reserve that would flock to the colors at the first tap of the drum, is an idle dream. The government trains young men for the navy of to-day, not for the navy of the dim, uncertain future.

The following article on "The Army and the Navy as Industrial Schools" is taken from one of our leading periodicals:

"That military discipline is an excellent preparation for work in factories, is asserted by a writer in *The Iron Age* (New York, July 29, 1909). In his opinion the enforced military service of the continental nations of Europe is of use to them in this regard, and he suggests that our own navy may perform the same function for us. He writes: 'An American who has spent considerable time in German shops comments upon the excellent discipline which prevails everywhere as the direct result of the military or naval service which all Germans are compelled to perform. The years of absolute obedience to superior officers have a lasting influence upon a large majority of men, as shown by them in the industrial works where they are employed in after life. Quick compliance with orders need not mean servility. It is the same obedience which the men from whom workmen take orders extend to their own superiors. It does not of necessity curtail suggestions, because the trend of discipline is of a different sort. We have heard American employers say that they like to get young men who have been trained in the navy under conditions as they have existed in recent years, because they have been well grounded in their work, are resourceful and above the average in their ability and willingness to make suggestions, and at the same time obey quickly, without sullenness and seldom with resentment.'

"The American Navy seems to be an industrial school worth taking into consideration. The industries of the country need well-trained men. Schools are being established in many centers in order that the supply may be increased. The suggestion of the

benefit of modern naval training is a good one. The war-ship of to-day is not unlike a great industrial plant. The immense complexity of machinery which performs the various functions of the vessel, combined with the equipment which looks after maintenance and repairs, affords the opportunity for a practical training which should be of great value to a young man after his term of enlistment has ended, especially if he follows the trade in which he specialized. Moreover, the fact that he has lived under strict discipline is a consideration not to be lightly discredited."

This is all very true. The navy seems to be regarded as a great training school for supplying the industries of the country with skilled labor. The forcible presentation of this truth by the press shows that the navy—to use a colloquialism—is up against a pretty stiff proposition, viz: how to secure to itself a permanent body of trained seamen—a body of seamen who will realize that they belong to an integral part of the national defenses. It is but natural that everyone, enlisted man and commissioned officer alike, should seek, from his own point of view, to better his condition. It is the point of view, then, that is to be established. If the enlisted man sees that his interests and inclinations are all with the naval service, he will remain in the navy; otherwise he will not.

To establish the seaman's point of view, there are two steps necessary—first (to repeat it once more), to enlist boys between the ages of fourteen and seventeen years (with the consent of their parents or guardians), and put them at once on board ship under training, mostly at sea, for a year or eighteen months at the very least; secondly, to enlist boys between fourteen and seventeen years of age to serve ten years from the age of eighteen.

Congress has been very liberal in providing for the advancement of enlisted men so that the boy who has anything in him, is sure to get along. Entered at the average age of fifteen years and a half and allowing one year and a half for the training service, he will have reached the age of seventeen years, the age now allowed for admission. After four years in the general service he will have become of age, and capable of forming a correct estimate of his own limitations. Here we have, on the one hand, a young man of twenty-one, who has had five and a half years experience on board a man-of-war during the formative period of his life; on the other the young man of twenty-one who has passed those years on shore; the one having all his affiliations in the service, the other

having all his affiliations out of the service; the one habituated to the restraints and restrictions of ship life, the other an entire stranger to them; the one a real man-of-war seaman, the other a landsman. From the naval standpoint can there possibly be a choice between the two? The young seaman who entered at fifteen years and a half, having become of age, will have, under the proposed plan, yet seven years to serve. But being a young man of average ability he will have been advanced according to his proficiency and good conduct. He cannot but feel now that he belongs to the navy, and that his interests are bound up and identified with that service. He easily passes from the ranks of the "common sailor" to that of petty officer, with the chances of further advancement. It lies with him now to secure the next step—that is, to become a warranted officer, *when he ceases to be an enlisted man.*

Nor is this all. He may yet obtain a commission, honorable retirement and a pension. If, on the other hand, he finds on reaching the age of twenty-one that he has mistaken his vocation, he has it in his power to purchase his discharge from the service. All things considered, it is a fair equivalent, in return for all the advantages offered by the government, to require a lad to serve for ten years from the age of eighteen. That boy should consider himself fortunate indeed who can gain such a position; and his parents should rejoice in the fact that an honorable vocation is secured to him for life.

A STUDY OF NAVAL STRATEGY.

OPERATIONS.*

III.

Commerce Destroying.

Too much has been written in recent years upon commerce destroying for it to be necessary to explain here what it is and what its avowed object is.

The English were the first to try this system of warfare which France afterwards used so frequently against them. Charles I, always short of money, found, as many people of our own time have, that squadrons are very costly; and, since Holland was an exclusively commercial nation, since she drew her wealth wholly from her sea trade, he thought there was no need to maintain those imposing fleets whose armament was a ruinous expense; it sufficed to launch frigates and light vessels in pursuit of the Dutch merchantmen, and thus to secure the double advantage of drying up the source of the enemy's wealth and at the same time growing rich upon their spoils.

The trial was made, but the results fell short of the hopes to which it had given birth; and the English Navy renounced once for all making commerce destroying the principal objective of a naval war. It was France that inherited the method.

It began to be put to full use under Louis XIV by the first of the Pontchartrains, and for an identical reason: want of money. It may in truth be observed that, at least in the reigns of Louis XIV and Louis XV, the number of ships in commission depended much less upon the actual state of our forces than upon the financial resources of the naval budget. It was not, as several historians affirm, the disaster of La Hogue which marked the decline of the navy, since, the year following, Tourville still kept the sea at the head of seventy ships; but it is true that the disarming of our squadrons followed close upon that fatal day, and the sole cause of this was the poverty of the Treasury. Pontchartrain then

*The second section of Operations, dealing with the conquest of overseas territory, is here omitted, a translation of it by Commander H. S. Knapp, U. S. N., having already been published in the Proceedings (see No. 127).

committed the enormous error—not to use a stronger term which would perhaps be more just—of alienating the nation's material and lending its ships to outfitters for carrying on privateering. Under this impulse given by the government, the number of privateers increased to fabulous proportions. Renouncing all commerce in order to capture that of the enemy, having the crews of the King's ships at their disposal for arming their vessels, the privateers settled down upon the Channel and North Sea like a flock of sparrows.

Privateering was then practised either with single ships of very light scantling or with small divisions composed of ships formerly belonging to the State; and about such divisions there hung independent privateers who profited by their protection and seized upon the booty they let slip.

England, little prepared against a kind of warfare that had never until then been practised to such an extent, does not appear at this period to have organized a system of methodical defense. Instead of seeking to protect her commerce and to prosecute the destruction of our privateers, she took advantage of the free field left her by our squadrons to attempt to destroy the nests where privateers took shelter. Thus she attacked Saint Malo, Dieppe, Dunkirk and Havre. The procedure itself might have been justified, if it had succeeded, but places as strong as our great maritime ports are not to be reduced by shells and a few thousand men.

However that may be, British commerce suffered immense losses. It is said that there were 4200 ships captured during the war of the League of Augsburg: insurance premiums rose to 30 per cent. France none the less was vanquished. If, therefore, privateering had some effect, it was not sufficient to bring the adversary to terms.

During the war of the Spanish Succession, after a trial of squadron warfare which was not without glory (battle of Malaga), privateering was taken up again with energy. We still find a Pontchartrain at the head of the navy, but not the same one; it is his son Jerome: and it appears that the latter does through principle what his father could argue that he only did through necessity.

The Northern division, which had been made illustrious by Jean Bart in the previous war, was re-established, and at first

several other small divisions were fitted out; but soon the ships of which they were composed were successively disarmed and there was left nothing but private armed vessels to carry on commerce destroying. Jerome Pontchartrain seemed to have taken upon himself to completely suppress the royal navy.[132] "Not only did he no longer replace, no longer even repair the ships of the State, but he dismembered them and sold a certain number piece by piece. Naval officers were more than once reduced to solicit their pay as an alms, and they were seen condemned to serve for the account of private ship-owners; the soldiers and sailors of the King's ships did the same so as not to die of hunger."[133] On the other hand, privateering was at its apogee: practised by men such as Duguay-Trouin, Forbin, Du Casse, Cassard and the Chevalier Saint Pol, it never had been, and never afterwards was, carried on with so much vigor and audacity. And yet the results are already inferior to those of the last war. The English begin to organize to combat it; they increase the escorts of convoys, send frigates against the privateers. After 1702, attacks upon the coasts are made less frequently; all efforts are directed towards protecting convoys.

Here, according to Campbell, is the result of the first five years of the war: "England has lost 30 warships and 1146 merchant ships, of which 300 were recaptured; on the other hand, she has captured or destroyed 80 warships, 1346 merchant ships and 175 privateers."[134] Throughout the whole war English commerce continued to grow, which indicates that it was efficiently protected.

What was the final result of the war? The provisions of the treaty of Utrecht, humiliating to France, show us.

Under Louis XV, the economical, but inglorious administration of Cardinal Fleury had permitted the navy to sink to the lowest ebb. When the war of the Austrian Succession broke out, it was necessary, after a first effort, to recur to privateering. There was no longer any choice of means.

"Commerce destroying at first gave satisfactory results. Pursued with ardor by the national cruisers and by numerous private

[133] In this historical sketch we shall frequently borrow from a remarkable work by Commander Lesquivit, which unhappily has not been made public.

[132] Lesquivit, *Étude historique et stratégique de la guerre de course.*

[134] Lesquivit, *ibid.*

ships, it caused very great losses to British commerce and furnished occasion for single-ship actions, glorious for our seamen, and in which La Motte-Picquet and Kersaint won fame. Even in distant seas, notably in the West Indies, where our colonists put all their capital into arming privateers, great damages were inflicted upon the English, not less than 950 vessels being taken from them.

"But, after the disasters of 1747, the French flag no longer appeared at sea. Twenty-two ships of the line constituted the whole French Navy, which sixty years before counted one hundred and twenty such. The privateers made few captures. Pursued everywhere, without protection, almost all of them fell a prey to the English. The British naval forces, without rivals, overran the seas unmolested. In one year, it is said, they took French commerce to the value of nearly 180,000,000 francs. The balance of captures in their favor was estimated at 2,000,000 pounds sterling. 'Estimated in another manner,' says Mahan, 'the losses amounted to 3434 merchant ships for the French and Spanish against 3238 for the English; but the ratio of these figures to the total ships of each country must not be overlooked.'"[125]

This time, again, did commerce destroying give victory to France? Did the treaty of Aix-la-Chapelle efface the clauses of the treaty of Utrecht?

The efficacy of a system that ended in a result diametrically opposed to the one proposed to be attained then began to be doubted; and the ancient ways were reverted to. During the eight years of peace that followed the war of the Austrian Succession, as many ships were laid down as the poverty of our finances permitted. At the beginning of the Seven Years' War, France could put in line sixty ships; but what could be done with such a force? After a fortunate start, nothing more was done to constitute squadrons except some unlucky efforts that were but the death struggles of the navy. Commerce destroying had to be again recurred to.

"From 1756 to 1760, the English lost 2500 merchant ships. This figure seems enormous and yet it represents but a tenth of the English vessels. In return we lost 240 privateers during the same period; our maritime commerce had completely disap-

[125] Lesquivit, *op cit.*

peared; and at the end of the war, in spite of exchanges, we had 25,000 seamen prisoners in England, while the English had only 1200 in France."[136] This difference is characteristic and requires no comment.

What were the hostile squadrons doing then while our privateers whitened the seas? No longer finding themselves faced by forces capable of standing up against them, they ravaged our shores, they took from us, one by one, our colonies; finally they even seized upon Belle-Isle. France could not keep on letting fragments of her flesh be torn from her; it was necessary to negotiate to put a stop to this dismemberment that risked letting the English establish themselves at our gates, in the islands that border our coast and form part of the centuries-old heritage of our fathers. The conditions were hard; we had to give up all that the genius of Dupleix had won for us in the East Indies, besides Canada, Senegal, St. Vincent, Dominica, Tobago and part of Louisiana. Never did commerce destroying so distinctly show its inefficiency.

The infatuation with this system had so completely passed away that as soon as Choiseul succeeded Berryer as Minister of Marine he attempted an invasion of England that it was too late to undertake and devoted himself to reconstructing our fleet. The excess of our misfortunes had, moreover, operated a revulsion; on all sides the building of ships was demanded. "Cities, corporations and individuals contributed to pay for constructing ships. The estates of Languedoc set the example by offering to the King an 80-gun ship. Paris followed them closely by causing to be built at Rochefort the fine ship *Ville-de-Paris*. Several other provinces, towns and companies followed this generous and patriotic inspiration, and, by the end of the month of January, 1762, the national zeal had created fourteen new ships and a frigate. A prodigious activity then made itself felt in ports but recently silent; everywhere there was building, everywhere repairing of ships."[137]

It was too late, but all these constructions formed the nucleus of the navy of Louis XVI. During the peace, the impulse did not slacken, and the war of American Independence found us ready to make head against the enemy.

[136] Lesquivit, *op. cit.*

[137] Lesquivit, *op. cit.*

I have already had occasion to say that in my opinion the French Navy at this period did not make good use of its forces. It was almost always superior in numbers on the field of battle, and, if it had employed against the English the same methods of fighting to the utmost that they employed against us, the result would have been quite different. In spite of all, we succeeded in holding their navy in check, and, on this account, commerce destroying was relegated to the second place; it became the accessory, and no longer the principal. Practised almost exclusively by individuals, it does not seem to have had a great development: the allies (French, Spanish, Americans, Dutch) took from the English 519 ships, and the latter took from them 534. For the first time the treaty of peace was favorable to France.

We come now to the wars of the Revolution and Empire, and are about to see history repeat itself as it were automatically. At first an attempt will be made to struggle in the lists with means that are insufficient, not in respect to numbers, but as regards quality; defeat will result and then recourse will be had to commerce destroying; from time to time squadrons will be reconstituted to attempt a descent upon the enemy's territory; then, in the last years of the war, commerce destroying and such enterprises as depend only upon chance for success will lose favor; we will begin to build up again a fighting fleet, but France will be worn out before the task is accomplished. Such is the spectacle that the two naval wars of the reign of Louis XV have afforded us; such is the spectacle that the two naval wars of the Revolution and the Empire are to exhibit.

Villaret-Joyeuse is beaten in the battle of 13 *Prairial* and Martin loses the battle of Noli.

The Committee of Public Safety announces to the country, with that emphasis which is one of the characteristics of the period, that it inaugurates a new method of warfare. The preambles of the decree of 23 *Thermidor,* year III, are interesting to recall; phraseology takes the place of strategy in them: "The new system of political warfare that your committee has adopted is more suitable to our political situation and will procure for us real advantages. This system will harmonize much better with the true interests of the nation than those displays of naval power that do but flatter personal pride and uselessly consume the resources of the Republic . . . . We have a single object to fulfil

and this object excites all our solicitudes, is the purpose of all our plans: it is to protect our own commerce and to destroy that of our enemies . . . . The English government, if it will, may flaunt its squadrons and parade them in tactical order (*sic*), the French will limit themselves to attacking it in what it holds most dear, in what constitutes its happiness and its existence, in its riches. All our plans, all our cruises, all our movements in port and at sea, will have for object only to ravage its commerce, to destroy, to overturn its colonies, to force it finally into a shameful bankruptcy." [128]

"The results obtained seem at first sight satisfactory. According to a table of Lloyd's (London), stopping at year V, the prizes taken by the two nations were distributed as follows:

	Prizes taken.	
Year.	By English.	By French.
1793	63 ships.	261 ships.
1794	88 "	527 "
1795	47 "	502 "
1796	63 "	414 "
1797	114 "	562 "
Total	375 "	2,266 "

"We cite these figures because they are constantly reproduced by all academic partisans of commerce destroying, in support of their thesis; we shall see further on what is to be thought of them.

"To protect their commerce against these raids of our privateers and our single cruisers, the English adopted the double system of convoys and of patrol by light divisions. Merchant ships were assembled, according to their destination, in ports designated in advance, and from these set sail under the protection of ships of war charged to conduct them to their destination. Three hundred, five hundred, even a thousand vessels were to be seen sailing in company in particularly exposed regions, such as the entrance to the Channel or to the Baltic Sea, where a better guard and a stronger protection were needed. This system had, it is true, many disadvantages: time lost in waiting for the convoy to assemble; inability to follow it on the part of many merchant ships; great lowering of the price of goods when the convoy arrived, owing to the large quantities thrown on the market at one time.

[128] Lesquivit, *op. cit.*

Thus many ship-owners preferred to run the risks of voyaging alone; but they were not thereby left completely alone, for upon the principal trade routes were stationed fast frigates, each with a fixed cruising ground and accompanied by light vessels, specially charged with their protection.

"Thus, closed around on all sides, receiving no help from our squadrons, our privateers, after struggles that were often heroic, but almost always disastrous, ended by falling into the hands of the enemy. Contemporary English writers fix at 743 the number of privateers captured from the opening of hostilities to December 31, 1800. Their crews went to crowd the English hulks, in which, in the year VI, there were 22,000 French prisoners.

"As for warships, the French Navy, which at the beginning of the war possessed 86 ships and 118 frigates, lost, according to the English historian W. James, 34 ships and 82 frigates by capture, 11 ships and 14 frigates destroyed by incidents of war, and 10 ships and 6 frigates by shipwreck. This is a total of 55 ships and 102 frigates, the latter taken mostly while cruising, in engagements between light squadrons or single ships. If to these figures are added 150 smaller warships and 2000 privateers or merchant ships, captured during these ten years of war; if it is considered that the united crews of all these vessels amount to about 70,000 sailors, that the greater part of these unfortunates perished in combats, in shipwrecks or in the enemy's prisons, the frightful voids then produced in the lists of the maritime inscription can be estimated. 'Out of 80,000 sailors formerly enrolled, there remained scarcely half to man ships with at the end of the war. So we may conclude that though privateering enriched some ship-owners during this war as well as in previous wars, it ruined our commerce and our maritime inscription.'[130] Commerce destroying itself had not been to our advantage, since, including privateers, our merchant marine suffered losses equal in number to those of English commerce.

"Had it at least ruined that commerce, had it led to the shameful bankruptcy spoken of by the decree of 23 *Thermidor*, year III? See what Pitt said on February 18, 1801: 'If we compare this year of war with the preceding years of peace, we shall see in the production of our revenue and the extension of our com-

[130] V. A. Bourgeois.

merce a spectacle as paradoxical as inexplicable and well formed to astonish us. We have raised our internal and external commerce to a height that it never attained before and we can regard the present year as the most satisfactory ever seen in this country.'"

In fact, external commerce, exportation and importation, which in 1792, the last year of peace, amounted to £44,500,000, increased in 1797 to £50,000,000, and in 1800 to £73,000,000.

"Although it cannot be denied that the loss borne by English commerce was a sensible one, it was no more than a war tax that, although burdensome, was incapable by itself alone of exercising a decisive influence on the policy of a powerful and rich country like England. It does not seem to have exceeded 2 per cent or 3 per cent of her total commerce. Taking an average of the figures given by different authors, we may estimate the mean number of English ships captured at about 500 per year. Well, in the three years 1793-1795, the annual number of entries and departures of English ships from English ports was 21,560; in the three years 1798-1800 it was 21,369, of which 500 forms but 2.4 per cent, although the former number includes neither coastwise nor colonial commerce.

"If the total number of ships belonging to Great Britain and her dependencies is taken, it will be found to amount to 16,728 in 1795, and to 17,885 in 1800, of which latter number 500 is about 3 per cent. This is a relative loss slightly greater than that occasioned by accidents of the sea at the same period (from 1793 to 1800 Lloyd's lists indicate a loss of 2967 ships) and much less than the loss borne by French commerce in the earlier years of the war. It must be added that this loss was partly made up for to England by the ships and goods taken by her own cruisers from the enemy and by the extension of her commercial operations under neutral flags." [140]

Such was the balance-sheet of commerce destroying during the first war.

Immediately upon the rupture of the Peace of Amiens, Napoleon turned his whole attention to the project of invading England, and naval operations were conducted with a view to assuring a passage to the Boulogne flotilla. Commerce destroying

[140] Lesquivit, *op. cit.*

was, therefore, at first only practised by private interests, without any well-defined system. But when the disaster of Trafalgar had dispelled the hopes that Napoleon had founded upon the navy, and it had been demonstrated once more that, in its state of dilapidation, it could no longer stand up against the English, the question arose as to how the remnants of our squadrons might be employed until a complete reorganization could assure him strength together with numbers.

The Emperor did not wait for Villeneuve's arrival at Cadiz to ask his minister for propositions in regard to the employment of his forces. Then it was that Decrès submitted to him the plan of flying divisions which, as he thought, must ruin English commerce. "Such," said he, "was the sort of war that he approved of." It was commerce destroying again, under a form that was not new, but that till then had only been used accidentally and without methodical development. The model for it was furnished, at this precise period, by Rear-Admiral Allemand's cruise. It is interesting to observe what the fate of all these divisions was.

While the drama of Trafalgar was unrolled, the Brest squadron remained intact. From the ships that composed it, two divisions were formed under the orders of Admirals Willaumez and de Leissègues, put out from Brest together on December 13, and separated at sea to carry out their mission.

The first division, of six ships and two frigates, was to go first to the Cape of Good Hope, then to cruise in the neighborhood of St. Helena to capture convoys coming from India, and then to proceed to the West Indies. After having ravaged the English colonies of those islands, Admiral Willaumez was to steer for Newfoundland, where he was to destroy the fisheries; from there he was to go to Iceland, Spitzbergen and Greenland, where English whalers were to be found, and he was not to return to France until he was incapable of longer remaining at sea.

Willaumez learned while at sea that the Cape had fallen into the hands of the English: he had to change his program, which made him lose a frigate, the *Volontaire,* which was captured in March, 1806, at the Cape, where she expected to find the division. The other vessels had gone to Guiana, where they separated into three groups which reached Martinique one after the other in June, 1805, after having barely escaped being captured by the English. On July 1, Willaumez left Martinique; but very soon

his vessels were scattered; the *Foudroyant* went into Havana after an action with the *Anson;* the *Impétueux* ran ashore on the coast near Chesapeake Bay to escape two English ships, and was burned by them; the *Patriote* and *Éole* entered the Chesapeake; the *Valeureuse* took refuge at Marcushook; the *Cassard* returned to Brest. As for the *Vétéran,* she cruised on the Grand Banks until August 25, waiting for her companions, and then steered for Belle-Isle. Chased by a hostile division, she took refuge at Concarneau, where a ship of the line had never before been. She did not get out until three years later, on April 20, 1809.[141]

Of the ships that stayed in America, two were sold on the spot, the *Éole* and *Valeureuse;* the *Foudroyant,* which carried Admiral Willaumez, reached Brest on February 7, 1807; the *Patriote* did not return until a year later, in January, 1808.

The division had captured seventeen prizes.

Rear-Admiral de Leissègues left Brest at the same time as Rear-Admiral Willaumez, with five ships, two frigates and one corvette. The division reached San Domingo in January, 1806; but its presence was very soon made known to the English forces stationed in the West Indies, and, on February 6, de Leissègues, on the appearance of the enemy, had to get under way by cutting his cables and to accept battle. The two frigates and the corvette alone escaped.

Commander le Duc set out from Lorient, at the end of March, 1806, with three frigates and one brig to go to Spitzbergen to destroy English whalers. The brig, the *Néarque,* was taken immediately after the start by the *Niobe.* Le Duc went first to the Azores, then he steered for Spitzbergen. On June 12, the *Guerrière* separated from her consorts, and was taken on the 18th by one of the vessels that had been sent in pursuit of the French division. The two other frigates returned to France at the end of September. They had made thirty-nine prizes.

Five frigates and two brigs set sail from the Island of Aix on September 24, 1806. Captain Soleil,[142] who commanded them, had orders to proceed to Martinique to land some troops there. Seen immediately on its departure, the division was followed and attacked by the English blockading squadron. The *Infatigable,*

[141] The *Vétéran* was commanded by Jerome Bonaparte.

[142] A former naval surgeon.

Gloire, Minerve and *Armide* were captured; one frigate and the two brigs succeeded in escaping.

The ill success of all these cruises slackened the zeal of Decrès, and we must go to the year 1809 to find another one.

Captain Troude set sail from Lorient on February 26, 1809, with three ships, three frigates and two frigates fitted as supply ships. He had orders to revictual Martinique and Guadeloupe, then to prey upon commerce until his supplies were exhausted, and then to return to the Mediterranean. On the voyage Troude learned that Martinique had been taken by the English, and, not wishing to anchor at Guadeloupe, which affords only open roadsteads and was closely watched, he went to Les Saintes. There he was at once blockaded by Admiral Cochrane with five ships, five frigates and 15 light vessels. Not daring to force the entrance, the English admiral adopted the plan of compelling the French division to go out by seizing the heights that overlook the anchorage; 3000 men were put on shore and easily drove back the little garrison. Troude, seeing that he would have to endure a bombardment to which he could not reply, decided to run through the English blockade. On April 14, the three ships got under way at 10 o'clock in the evening. Followed immediately by the enemy, two ships escaped and on May 29 reached Cherbourg; the third was captured.

The dispersion and partial destruction of all these divisions proceeded from the very nature of their mission. As soon as the ships arrived upon their cruising ground, they were obliged to separate, whether to cover a larger extent of sea, or to perform such tasks as putting ashore the crews of captured ships. They therefore cruised only by successive rendezvous, and the enemy bent all his efforts to making them miss these. In fact, as soon as the departure of a division became known, the English government sent in pursuit of it a greater force, which co-operated with the naval forces permanently on the station. After a longer or shorter time, the French divisions were overtaken, because the prizes they made revealed their presence in the region where they were operating. The successive captures of their bases of operations was likewise an obstacle to their movements. We have seen that Willaumez and Troude, proceeding one to the Cape and the other to Martinique, had suddenly to change their plans upon learning of the English captures of those colonies; and it is lucky

that they were able to get this knowledge from neutrals soon enough not to fall into an ambush. The capture of the various ports where our vessels could revictual was a further means of cutting short cruises against commerce.

Whether for lack of foreign bases, or because of the tragic fate of our divisions, or perhaps for both these motives, an end was put to Decrès' system, and commerce-destroying raids ceased after 1809; they were only really energetically carried on during the two years following Trafalgar. Thereafter, we were content to send out frigates in pairs, without subjecting them to too rigid instructions, and they were ordered to seek the nearest port when they could no longer keep at sea. Most of these frigates were captured.

The Emperor had accepted Decrès' propositions after Trafalgar without conviction. For a long time he had his mind made up as to the effectiveness of commerce destroying; but he saw in it a means of training crews in the interval until he had built up again a navy. Ships were being built in all the ports of France, as well as at Antwerp, in Holland and at Genoa. In 1809 we possessed already 60 ships. When the Empire fell, there were 44 of them in ports outside of France, of which we were able to retain but a part. The navy of the Restoration was constituted of those left to us by the enemies. Napoleon, therefore, saw no other way of waging war at sea than by attacking the enemy's naval forces: after an experience of more than 20 years, he reached the same conclusion as the seamen of the reign of Louis XV.

Such are the facts. It remains for us now to determine what the causes are that have always made commerce destroying fail, and how conditions have been modified by the use of steam and the relative condition of modern navies. Finally we shall have to consider how effective it would be in a conflict with England.

* * *

The discussions to which the question of commerce destroying has given rise have often led its partisans to search out somewhat curious arguments in favor of their thesis. Thus it has been asserted that the preference shown by admirals for squadrons originated in the desire to hold on to fine commands. I doubt if a motive of this sort has ever influenced, even unwittingly, the views of our chiefs; but this reason, if it existed, would not suffice

to explain the repugnance manifested by a great majority of officers for any system that led to making commerce destroying the prime object of a naval war. As far as those are concerned for whom an admiral's stars are as inaccessible as the stars that glitter in the heavens, and their name is legion, such a consideration would have no weight with them. I will even go further: if we were not firmly convinced that commerce destroying, raised to the estate of a system, would compromise the maritime destinies of France, our sympathies would be won for it from the start. There is no doubt, in fact, that a direct struggle against the naval strength of a country which, like England, has and will for a long time yet have an incontestible superiority over us, would be a difficult part to play, and one in which we would all risk losing our lives and reputations. Confronted by this grave danger, we would much prefer to devote ourselves exclusively to pursuing the enemy's commerce and to content ourselves with avoiding attack by the enemy's cruisers, if we did not think that we should thus be playing the part of dupes. We must, therefore, have arguments of another sort to influence us, and such I shall now endeavor to set forth.

"Naval warfare, we are told, should not remain indefinitely cast in the same mold, and direct attack upon the hostile forces has been tried; to it we owe our worst disasters. Is it not foolish to persist in practising a system of war that has never yielded anything but failures?"

The reasoning of the partisans of commerce destroying is thus, we believe, faithfully summed up.

This way of putting the case is not exact; although squadron warfare has brought us disasters, we owe to it and to it alone our naval glory.

In what periods has the French Navy shone with the most brilliant luster? During the first part of the reign of Louis XIV and during the war of American Independence; that is to say, in the periods when it held the enemy's forces in check. On the contrary, the blackest pages of our history correspond to the periods when commerce destroying was exclusively practised. It is true that the latter usually followed a defeat; but it was not always imposed by the helplessness of our navy: the poverty of our finances was often much more its cause than lack of vessels.

It should not be held, therefore, that France has persisted in

wishing to struggle in the lists, when it is manifest, on the contrary, that on several occasions she has abandoned prematurely, and after a single reverse, a policy that had not been without glory, and that she has persisted in attacking commerce in spite of the negative results thereby gained. And if, contemplating the past, there is something we may regret, it is less the principle itself of squadron warfare than the way in which we practised it.[143]

In any event, it is at least strange to propose as a novelty to-day a system that France practised for more than a century with unexampled fury and of which she has made a specialty.

Of the two schools that divide the navy, neither has found a new formula: one is inspired by the traditions of Colbert, Seignelay and Castries; the other has entered upon the heritage of the tribe of Pontchartrains, Berryers and all those ministers who may be considered the assassins of our naval power. We draw no conclusion; we merely state the fact.

When the partisans of commerce destroying point out how vulnerable England is in her commerce, when they complacently enlarge upon the number of merchant ships that furrow the seas, upon the amount of food supplies that they carry, upon the small provision held in the United Kingdom, etc., they make a statement of reasons that does not lack impressiveness. But all these arguments are but the statement of the problem; they do not furnish us with its solution. It is not enough to say: we will starve out England; it is above all necessary to see what means we shall have at our disposition for attaining our object and what means England has to oppose them with. The result of this comparison will give us a correct opinion as to the efficacy of commerce destroying. But this nub of the question has always been put aside by partisans of commerce destroying, as if they were afraid to touch it.

Yet, when a cause has had in its service such men as Jean Bart, Duguay-Trouin, Forbin, Cassard, the Chevalier Saint Pol and still others whose names are less known (Thurot for example), when we see so much heroism and perseverance end in failure, we have the best of reasons to think that, though the principle of commerce destroying is attractive, its application presents serious

[143] We have sought to show, in the first part of this study, the difference between our procedures and those of our enemies; we shall not return to the subject.

difficulties; that, though it is easy to capture commerce, it is equally possible to protect it.

How can any sincere man fail to be impressed by the fact that, during war, English commerce, instead of declining, increased?

If, therefore, to-day we hope for a better result, it is either because a navy of sailing ships was not as well adapted to commerce destroying as a steam navy, or because in the past the thing was badly done. We will now examine into this.

In the 17th century the respective situation of each side was as follows:

England had a war fleet and a commercial fleet, and the latter could not give up business on account of the economic situation of the country.

France had a war fleet and a commercial fleet, and the latter abandoned traffic to prey upon the enemy's commerce.

Thus privateers supplemented our fleet with a swarm of light vessels that cost the State neither a ship nor a cent, while the English, on the contrary, had to divert a number of ships from their fighting fleet to protect their commercial fleet.

As long as the French squadrons held in check the English squadrons and forced them to remain concentrated, privateers could with impunity chase the enemy's commerce, but nothing less than this diversion could permit them to venture to sea, since they were almost all of small size.[144]

Practised under such conditions, commerce destroying could not but be advantageous for France. If by itself alone it did not suffice to reduce England, at least it did her serious harm and contributed its share in the general operations. It constituted a net gain, without any counter gain to the adversary.

But as soon as commerce destroying, ceasing to be the monopoly of private interests, became more and more the objective of the navy, which devoted its own ships to it, England could divert from her fleets a sufficiently great number of ships to organize

[144] Many people imagine that our privateers of olden time were capable on occasion of fighting against the enemy's frigates. There actually were some vessels built by ship-owners of Dunkirk and St. Malo which had quite heavy batteries, but they were an insignificant minority On referring to engravings of that period, we note with astonishment that the ordinary type of privateer was very similar to our present Iceland schooners. That is what explains the great number of privateers.

a systematic protection of her commerce, without ceasing to possess superiority on the field of battle. So the period of full development of commerce destroying is not that when its results were most considerable.

To-day letters of marque are done away with. To carry on commerce destroying, it will be necessary to devote to it national vessels, paid by the State, manned by crews belonging to the State. Consequently, our fleet of the line will be by so much diminished, and England will be able, as well, to diminish hers correspondingly without causing any change in the ratio of forces. To our commerce destroyers she will oppose cruisers. The result will be: on the one hand a fleet of the line opposed to a fleet of the line; on the other hand, a fleet of commerce destroyers chased by a fleet of cruisers. The situation will no longer be the same: it will have become worse.

France can diminish the number of her battleships to increase that of her commerce destroyers: England will do the same, or rather she has already done so. By consulting a list of the English fleet, we see that her superiority in cruisers is as great as her superiority in battleships, because every time that we lay down fast ships, her naval program is augmented by a greater number of cruisers that are as fast as ours and are ready before them.

And if France, yielding to public opinion, decides to turn wholly to commerce destroying, she will cease building new fighting ships and, after a while, will have nothing but commerce destroyers. England, for her part, will likewise have only cruisers. And then we shall find ourselves again, in the matter of the employment of forces, in the situation we were in under Louis XV and after Trafalgar, with this double difference that instead of employing, for or against commerce destroying, ships and frigates, each side will have a special material, and that we French will no longer have the help of the privateers that, taken all together, formed the most numerous part of the commerce-destroying fleet. As far as the means for attacking commerce are concerned, the navy of to-day, therefore, affords resources for commerce destroying inferior to those of former times.

Will we, at least, find compensation on the side of commerce itself? It does not seem so.

With steam navigation, merchant ships will be more difficult to find, because they are no longer to the same extent as formerly

obliged to make land at the limits that mark the turning points of commercial routes.[145]

Moreover, although British commerce has increased in great proportions, the number of ships that transport it has diminished, because their capacity has largely increased.

There is also another factor that will sensibly affect the results of war upon commerce.

Formerly, neutral commerce was of small importance, and when it fell into the way of our privateers it was always lawful prize under pretence of carrying contraband of war. As the nations to which it belonged had no navies to support their claims, neutrals borrowed the English flag to enjoy its protection.[146] But to-day England no longer has an exclusive monopoly of maritime transportation, and in time of war this circumstance will be useful to her. We shall be obliged to be mindful of the susceptibilities of neutral powers, in order not to indispose towards us navies as strong as those of Germany and the United States. A part of the products indispensable to Great Britain will sail under neutral colors. Under this ægis, commodities will come to be heaped up in the storehouses of Germany, Belgium and Holland, whence they will only have to cross an easily guarded arm of the sea.

Finally, the economic conditions of the life of nations have been profoundly altered in a century and have their retro-action upon the duration of conflicts. But commerce destroying, from its very nature, requires a certain period of time; time is necessary to make its influence felt and, by the privations it engenders, to determine in the country that suffers from them a current of opinion favorable to peace. Can war last long nowadays, seeing the sacrifices that it exacts? For France it will entail an absolute stoppage of maritime transportation; the colonies will be completely isolated; the great commercial ports will remain deserted. At the

[145] Cape Finisterre and Cape Saint Vincent, for example, see a great number of ships pass daily; but as soon as it is known that there are privateers there, they will keep well out to sea, and all those vessels that during peace are to be found concentrated along a single line will be dispersed over a width of 50 or even 100 miles. Sailing ships, on account of their crude methods of navigating, could not dispense with making land at certain capes.

[146] This is a truly extraordinary fact and shows to what an extent English commerce was protected.

same time we shall lose our best customer, which is England herself. How long will such an abnormal condition be able to endure? Is it not to be feared that in seeking, by a prolonged effort, to make the English die of hunger, we shall ourselves succumb to starvation?

In truth, neither the steam navy nor the economic conditions of the nations can bring to commerce destroying the elements of success that have been wanting to it in the past.

But perhaps we have not known how to practise it.

Commerce destroying is a guerilla warfare carried on upon an immense plain: the sea. This plain is furrowed by the commercial routes that merchant ships follow. If we trace these routes on a chart, we observe that in certain regions traffic is very dense, and especially so in the vicinity of England's shores. Let us now shade all the places where traffic is concentrated. All the shaded parts constitute the field of action of commerce destroyers; they are attracted there as larks by a mirror.

So long as they remain sole masters of the field, they operate quite at their ease, and, if affairs continue in this state, there is no doubt but that results will accord with forecasts; but as soon as hostile cruisers hasten there the situation is altered.

Part of the commerce destroyers succumb; the rest quit their field of action. The latter are then obliged to fall back upon other regions less frequented, where they are still pursued, and, finally, those that escape take refuge in waters so deserted that their captures have no effect upon the enemy.

There are, therefore, likewise fields of battle in warfare upon commerce, just as in no matter what system of war; the only difference is that they are very extensive. If they are easy to take possession of, they will be the more difficult to keep; and there as elsewhere advantage will rest with numbers—that is, will be England's.

Naturally, vast regions cannot be swept clear in an instant; time and method will be needful. It is for this reason that commerce destroying always passes through a period of great profit at the beginning of a war; but bitter disillusions will come from basing calculations on the results of the early phases of hostilities.

The weak points in commerce destroying are now apparent.

In order that it may be efficacious, it is necessary not only to occupy the field, but also to remain master of it *by force*. Well, it

has not succeeded in the past precisely because neither privateers nor flying squadrons were of sufficient strength.

If we admit that England will not let herself be starved to death without using every possible effort to feed herself, we are forced to this same conclusion in spite of ourselves.

Let us first fix upon the type of commerce destroyer to adopt, for they cannot be improvised on the day when war is declared.

Looking at commerce destroying from our former point of view, we need a vessel whose principal qualities are speed and radius of action. These two elements can only be obtained at the expense of armament and protection, and thus we shall have the *Guichen* type.

This vessel, in the presence of a hostile cruiser, has not two courses to follow; there is but a single one: to flee. The next step would be to examine the effects produced upon the results of commerce destroying by the necessity of keeping constantly on the *qui-vive* and abandoning one's cruising ground to avoid being captured; but, without going so far, it is more than doubtful if speed will guarantee impunity to the commerce destroyer, since he has other things to do besides fleeing; he is there to stop merchant ships and this obligation will put him in constant danger.

Let us try to take account of what would happen.

We are cruising on board the *Guichen*. Smoke is seen on the horizon; we run down towards it. Is it a freighter? or is it a hostile cruiser?

It is a freighter. A shot is fired across her bows. She stops. A boat is lowered and takes a boarding officer to examine her papers.

The vessel is English and so is good prize. A prize crew is put on board and she is sent to France.[147]

The *Guichen* resumes her cruising.

A second smoke appears. This time it is a fast vessel; with the telescope three funnels are seen rising above the horizon, and the ship approaches rapidly.

Is it not a cruiser? The captain becomes cautious; he considers whether he shall take to his heels.

[147] Or she might be sunk after taking off her crew.

At this instant the vessel changes course; she has seen us and wishes to fly. Full speed.

The *Guichen* fires a shot. It is a lucky one; the shell, fired at extreme range, falls close by the steamer, which at once stops and turns her broadside to show she has done so.

The same formalities as before take place.

But, while the prize is being manned, which threatens to take a long time, since it is necessary to transship part of the personnel, a third smoke is seen to appear. It is another big ship, doubtless a German transatlantic liner: she has four funnels. But no, she heads for the *Guichen*. Malediction! It is an enemy cruiser that was following the steamer; we have fallen into a snare. Fire up, full speed ahead, and let us fly from her.

At what distance will the commerce destroyer recognize the cruiser? When guns were only effective up to 500 meters one could always take flight well before being within cannon shot, but now . . . . At 6000 meters it is hard to tell an English cruiser from a liner; for France is the only country that has given its vessels that long snout which reveals their identity from far off. Thus, our commerce destroyer, before she is under full head of steam, will already see shell raining about her; and, as she has neither guns (or so few as to count for nothing) nor protection, there are nine chances in ten she will be hit and have her speed reduced. And then she is lost.[148]

And at night what is to be done? No doubt boarding vessels ought not to be practised,[149] but it will be impossible to guard against disagreeable encounters.

In truth these vessels that will have the double care of watching for merchant ships—to stop them—and for warships—to escape from them—seem to me of no account. It is to be feared that anxiety for self-preservation, which is here a necessity, will outweigh desire to capture commerce, and the results of the raid will thereby be sensibly affected.

It may be admitted that commerce destroyers ought not seek to fight, but none the less they will often be obliged to make a stand, and it is not permissible that they should be constantly compelled to interrupt their cruising or to abandon prizes.

[148] There will happen what happened to the *Rurik*.

[149] Which in itself will let 50% of the commerce escape.

Therefore commerce destroyers must have means equivalent to those of cruisers; that is why the *Guichen* and *Château-Renault* are absolutely unfit for the rôle that is assigned them.

This conclusion seems now to be admitted; the navy, after having sacrificed 32,000,000 francs (actually thirty-two millions) to meet the views of partisans of commerce destroying, has renounced this type of ship to take up with armored cruisers.

Superiority of speed, that superiority which is counted upon, quite wrongly, to give escape from all bad places, therefore, no longer exists in fact. As we have already said, no power holds a monopoly of speed. This can only be obtained by developing motive power at the expense of military power, and to equal forces will correspond sensibly equal speeds.

If we seek an increase of strength by an increase of displacement,[150] France may have on the stocks an unrivaled vessel, like the *Jeanne-d'Arc*, but she will be immediately followed, caught up with and distanced. In this race of displacements, she will not be able to pretend to possess a collection of cruisers of a mean value equal to that of the English cruisers.

It is not to our interest, moreover, to seek the "stronger," which necessarily ends in the "bigger." Since commerce destroying is advocated as an economical system of making war and since, from its very nature, it demands a great number of vessels, it is an absurdity to practise it with instruments no less costly than battleships. Yet despite ourselves we are drawn into the fatal downward path by solicitude not to be gotten the better of, and to be convinced of this it suffices to measure the advance made from the *Dupuy-de-Lôme* to the *Jeanne-d'Arc*. While the latter was struggling through her trials, the English were already able to oppose to her the cruisers *Bacchante*, *Cressy*, *Hogue* and *Sutlej* of 900 tons greater displacement. The *Léon-Gambetta* of 12,500 tons was then begun, but the *Good-Hope* of 14,100 tons was in service before her. So a cruiser of 16,000 tons is talked of. And who make such a proposition? The partisans of commerce de-

[150] This is the method employed by the Americans in 1812. Intervening in the midst of a war carried on with instruments and methods long in use, they opposed to the English frigates a stronger and better armed pattern of frigate. That was the cause of some successes that they obtained in minor operations.

stroying, those who have not ceased to protest against a navy of floating millions, the adversaries of "leviathans."[131]

From this fact may be judged how complex the problem of commerce destroying, so simple in its conception, becomes when an attempt is made to apply it. Even if we devote all our resources to building cruisers, we will never have more than a very restricted number of such dimensions.

See then what will happen.

Disposing of only a small number of vessels, we shall be still more imperatively than our ancestors under the necessity of going to seek merchant ships in regions where traffic is very dense; and we will send our commerce destroyers to cruise upon fixed lines which will thus become barriers.[132]

It is easy to see that England will not let them operate in peace without doing anything. Disposing of a greater number of cruisers, she will launch them in pursuit of ours, a part of which will be captured; the rest will have to evacuate a region where there will no longer be any safety for them.[133]

Yet it will be very necessary to return there, for if our cruisers undertake to traverse the seas without system, they will separate themselves from the zones of concentration of commerce and the number of their prizes will at once fall very considerably. They will still inflict upon the enemy losses, but they will only amount to 4 per cent or 5 per cent of his total commerce.[134]

[131] Our battleships are as yet only of 14,800 tons.

[132] The only precise suggestion that is to be found in writings upon commerce destroying as to the way to employ cruisers, is that they be sent to cruise on the lines Ouessant to Cape Lizard and Ouessant to Cape Clear. It does not seem that this disposition would produce serious results in the Channel (leaving out of account hostile cruisers). Merchant ships will follow the English coast, and the whole southern part of the Channel will be deserted. (See on this subject C. Ballard's work: *De la Protection du commerce en temps de guerre.*)

[133] The presence of cruisers cannot remain unknown. Ship-owners know the route followed by their vessels; they are notified by telegraph at each port of call. The least delay of receipt of a telegram will indicate the presence of the enemy between two stopping points. Neutral vessels that cross the cruising grounds of the enemy will not fail to relate what they have seen, and the English consuls will inform their government. Finally, in certain regions, the sending of cruisers will not be delayed until commerce destroyers have made known their exploits.

[134] And this deficit will easily be made up by neutral commerce.

Thenceforth commerce destroying will have been truly bankrupted. Not only will it not have attained its object, which is to starve England, but it will have left us wholly disarmed against all the enterprises of the enemy, who will take our colonies one by one; it will only discount a war tax that we will repay when peace is made.

Another method will then be sought, which, by increasing the strength of the commerce destroyers, will permit them to maintain themselves on the cruising ground. For single cruisers, groups of two or three cruisers will be substituted; and even, for full measure, they should be accompanied by a few light vessels. The object of these divisions will be to hold their own on the cruising ground while the light vessels spread about them, hunting for merchant ships.

Already the principle of commerce destroying is altered. Its action is decomposed. On the one hand, a division representing the idea of force; on the other, light vessels which depend upon it not to be captured by the enemy's single cruisers.[155]

For a time these new arrangements will disturb the enemy's plans, but after a few days he will follow the movement and adopt a like distribution of forces. Ours will end, therefore, by being taken, as Decrès' divisions were, if they are not reinforced in time, and thus, from thread to needle, we shall be led to collect, in regions constituting fields of battle of commerce destroying, all the forces at our disposal, of whatever nature, in order to remain in control.

Thus commerce destroying, which starts out to be a war of skirmishers, would in the long run end in a war of squadrons, if sufficient means were available to prolong the struggle indefinitely.

From the moment that two adversaries contend for a field, each of them despite himself is led to outbid the other so as to remain master of it, until all the resources, on each side, have been exhausted. The encounter of two masses is, therefore, not the result of a more or less correct conception—it is a consequence of the state of war.[156]

[155] These auxiliaries have no need of either a considerable displacement or fighting strength.

[156] Whether we wish it or not, we shall never be able to attack an assemblage of forces except with the aid of another assemblage of forces; and

We have a striking proof of this in the Dutch-English wars.

No struggle between nations has had to an equal degree the character of an economic conflict. Between England and Holland, the destruction of commerce was not, as it was later on for France, a means; it was the very object of the war. The question at issue was to whom should belong the monopoly of maritime commerce. Nevertheless, no other war offers us the spectacle of so great a number of pitched battles and the assemblage of such great masses. And the two adversaries did not come thus to contend in the lists with fixed determination through a tacit understanding. They were led there despite themselves, by insensible degrees, because they could not do otherwise. And what proves it is that the concentrations took place especially at the end of each war, after each side had fruitlessly endeavored to attack and protect commerce directly.

Here then is how we look at industrial warfare.

The objective is to prevent merchant ships from leaving ports without being captured and to arrest in passage those that are entering them. Against England, therefore, it would be necessary to occupy in force the Channel, the North Sea and St. George's Channel, and to station there squadrons in sufficient number to hold their ground while light vessels radiate from them.[157] There would necessarily result battles in which we would be worsted, because, receiving the onset instead of provoking it, we would be beaten in detail.

Practically, therefore, it is necessary to abandon temporarily commerce destroying and to employ our forces in defeating squadrons, not in the Channel or the North Sea, but on the field of battle that offers us the greatest chance of success. If we are conquerors, we will then bring our forces back to the field of commerce destroying, and occupy it in sufficient strength to prevent the remnants of the hostile squadrons from driving us off.[158] As

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we are compelled to collect vessels in squadrons to be the stronger or as little weak as possible.

[157] But, then, it is no longer necessary to construct a special type of vessel.

[158] Though one be not strong enough to carry the field of battle to the vicinity of the enemy's coasts, which is the point where merchant ships converge, at least all traffic will have been stopped short in the region where one has superiority. Suppose a victory in the Mediterranean so

may be seen, in this case as in all others, the final object will only be attained after a contest; it will be the fruit of victory.

I anticipate the objection here: we shall be beaten.

It is probable. When a navy has allowed itself to be distracted from its objective by devoting its resources to the chimerical pursuit of direct defense of the coast and to the Utopia of commerce destroying, it finds itself taken unaware when it is obliged to descend into the arena; but if we could restore to the offensive and to battle all that has been taken from them, we would have a strength so formidable that the strongest navy would not engage in a struggle against us without apprehension. None the less we would be the actual inferior. Even so, what then? That would not prove that guerilla warfare can be carried on in an open, level country, nor that the necessity of fighting can be evaded, whether one be strong or weak. War would verily be too easy if a formula were enough to cause the specter of the English Navy to disappear. And I confess, to my shame, that there is something I cannot comprehend when I hear this theory sustained that commerce can be destroyed without having to fight with those who defend it.

Between advocates and opponents of commerce destroying there is no difference of opinion as to the best method of warfare to adopt, but only as to the best way of carrying it out.[139] Ought we attack directly property afloat or is it necessary first to aim at the military forces that are the safeguard of that property? The whole question lies there.

Here we are then back at our point of departure; for if reference is made to the opening of this study, it will be seen that this is the question that arose in the first days of modern naval warfare.

So, for a century and a half, maritime nations have dispensed treasures of energy to reach discovery of the most efficient way to destroy maritime wealth, and to-day it is proposed that we should make the same experiment over again at our own expense. It is because France has never been willing to admit, or has not been able to perceive the lesson revealed by events, because for so

complete as to force the English to evacuate it; eight or ten ships of any sort, even wooden, will suffice to cut the Mediterranean in two between Tunis and Sardinia, Corsica and Provence, and to stop all merchant ships.

[139] For, commerce destroying leading to the ends of war, there is no reason to reject the principle of it.

long a time she has recommenced history with each new war. Persisting in indefinitely pleading the same process, she has always lost it, because the cause was bad.

Does this mean that there is nothing to gain from direct attack upon the riches scattered over all the seas of the earth?

Perhaps there is, but only on condition that it is made a secondary operation, with the object of immobilizing at small expense a large number of the enemy's vessels.

We have said that it was the necessity of always keeping the same cruising grounds that ruined the privateers; but if it is no longer sought to starve the enemy, if we limit ourselves to threatening his property so as to compel him to protect it, it is apparent that very mobile divisions can appear in a region which they know to be temporarily unprotected; then, after having made their presence felt so as to attract the enemy, they can suddenly change their field of action and appear at another point far away. Then the enemy, arriving too late, will remain on the spot for fear of a return to the attack. Evidently the necessity of constantly moving about and of traversing great unoccupied stretches of sea will never permit doing enough harm to commerce to seriously affect the fate of the war; but if there can thus be created a sufficiently important diversion to turn the enemy aside from attack upon our colonies, which our foreign stations are too weak to defend, if, above all, he is forced to detach part of his cruisers from his squadrons, the general operations will have been seconded.

We come thus to a system which resembles that of the light divisions of the First Empire, but which must be perfected so as not to reach the same result. Those divisions ended by disintegrating, for lack of maintenance; for losses always occur in a naval force on active service, even when it does not meet the enemy (which one can never be sure of); moreover, even though moving about, they delayed too long in a single region and ended by being come up with.

In order to avoid these disadvantages, it is necessary that our divisions be more mobile and that they be strengthened in permanent fashion by mutual co-operation.

But the effect of these dispositions can have but a limited duration; at the end of a certain time the enemy will always finish by seeing into our game and by getting at the commerce destroyers. They will produce their effect, therefore, especially at the begin-

ning of a war, before the system of defense has been organized; if they escape long enough to enable decisive blows to be struck on another field, the object will have been attained.

But it would be a mistake to weaken oneself by building a special material for this sort of diversion, or to employ in it ships of the first class. Everything indicates that the ships on foreign stations should be devoted to this rôle. To that end let us assign to such stations vessels of reasonable characteristics, not wooden ships without speed, and especially without radius of action.

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We cannot close this chapter, written before the Russo-Japanese war, without adding to it the conclusions to be drawn from that conflict in respect of commerce destroying.

The belligerents adopted different attitudes with regard to the destruction of commerce.

Japan occupied herself first with securing freedom of the sea, and completely neglected attacks upon commerce. She only began to stop commerce by cutting off access to the two Russian ports of Vladivostok and Port Arthur after there were no more hostile ships to fight.

Russia preferred to divide her efforts; she wished to carry on concurrently military action with the Port Arthur squadron and commercial action with the Vladivostok cruisers. She thus weakened herself in the principal theater of operations without doing appreciable damage to Japan; since the cruiser division, pursued from the moment its presence was revealed by captures, was obliged to quit its field of operations and hastened to return to port.

One fine day there happened what must inevitably happen: the cruisers had to accept battle and one of them succumbed. From that moment it was all over with commerce destroying.

What a lesson for the advocates of war upon commerce!

IV.

Blockades.

Blockades consist of stationing in the vicinity of a port a naval force charged with watching its approaches so that no vessel can enter or leave without being seen and pursued.

The system of blockading dates from the wars of the Revolution and Empire. Until then France had often seen English fleets cruising off Ouessant to watch the going out of our ships or to intercept the Levant contingent on its arrival; but these appearances were only momentary, and they never had either the permanence or the duration that characterize true blockades. Under the Monarchy, vessels had not yet acquired the nautical qualities, the endurance and the self-dependence necessary to guard the entrance of a hostile port in all seasons and through all weathers. We know, moreover, that fleets were accustomed to disarm at the end of the autumn; so that naval operations only lasted for a few months and began again on a new basis each spring.

These customs had a direct influence on the fitting out of ships and on the rules of naval warfare. Fleets of many ships never had enough provisions for cruises of considerable duration; vessels were not arranged to carry great quantities of food and water, and to that cause should be attributed the epidemics that so often flourished on board of them and hindered their operations.

When, in 1793, a new period of naval wars opened, which until 1814 was only broken by the short peace of Amiens, the nautical art was already in evident progress. The hydrography of the most frequented shores was better known, and the long voyages of exploration undertaken after the American war had brought about modifications in the construction of ships that made them more manageable instruments; at the same time there were formed officers and crews capable of encountering the elements instead of letting themselves be enslaved by them.

But it was the special character assumed by the war which, more than any other cause, forced England to enter upon a new way. The government of the Revolution did not conceal its intention of taking up on the sea the gage flung down by England,

just as it had not feared to stand up against all the continental powers on land; and it had proved, by Hoche's abortive attempt in Ireland, by General Humbert's expedition and by that to Egypt, that it would not stop at the most risky operations and also the most unexpected.

Little anxious to experience again so disagreeable a surprise as the conquest of Egypt, fearing all from a nation so enterprising, uneasy lest she might see renewed on the ocean, and at her expense, the prodigies that national enthusiasm had raised up on land, England saw herself forced to abandon the old methods that until then had sufficed to give her dominion over the sea and to guarantee the safety of her territory. For a new situation, new means were necessary. And it was then that she thought of paralyzing our navy and that of our allies by holding the fleets shut up in port. According to an expression now in use, she aspired to carry her frontier to the enemy's shores; and, behind that frontier, the sea would belong to her.

What is stranger is that after having conceived this gigantic plan she succeeded in realizing it, if not completely, at least in an efficient form.

But the Admiralty did not have recourse to this extreme means at the very first by intuition; the necessity of it appeared little by little. The war began on the old basis; the squadrons of the two sides went out and in without being watched; they encountered one another when opposing interests led them to the same place.

But when Villaret-Joyeuse is beaten at Groix, at the end of June, 1795, Bridport, who has a convoy of émigrés to land at Quiberon, blockades him at Lorient. The blockade lasted till the day when the Count d'Artois left the island of Yeu, definitely renouncing putting foot in France. It had lasted five months.

It was an indication. From this moment Brest is constantly watched; but the bulk of the English forces continue on station in England. The sortie of Morard de Galle, with a fleet of 45 ships, shows the need of a stricter watch; and after 1797 the look-outs of Ouessant, save for short intervals, will lose sight of the English fleet no more.

The blockade was extended to Toulon, Rochefort and Lorient in succession; then, as new enemies threw themselves into the arena, it enveloped the Texel, Ferrol and Cadiz. The English Navy has never done anything greater.

To form an idea of the effort required by such a task, the situation of these squadrons must be imagined, cruising far from any base, during entire years, winter and summer, and threatened at each instant with being driven upon a hostile coast by an on-shore gale.

The solution adopted by England was not perfect. It was exempt neither from disadvantages nor from dangers; but under the circumstances it was still the best.

At first the blockades were never permanent; bad weather always ended by sweeping away the blockading force and opening the entrance to our ports. Bruix and Ganteaume in this way were enabled to go out from Brest; Brueys and Villeneuve from Toulon. And the success that seemed to favor these admirals, at the beginning of their operations, might make us doubt the efficacy of blockades. But when we reflect that the war lasted twenty years, we are astounded that during such a lapse of time our squadrons were able to find only five or six opportunities of escaping. And, furthermore, under what conditions? The bad weather that drove off the English squadron visited our ships as soon as they went out; and as their long inaction inside had not prepared them to struggle with the elements, their mission, scarcely begun, was endangered. The very tempest that permitted Morard de Galle to leave Brest dispersed his ships. Bruix likewise saw his ships dispersed, and it is a miracle that he was able to reassemble them. Villeneuve experiences such damage on his sortie from Toulon that he is forced to return.

In order to realize how vigorous the blockades of this period were, we must call to mind that our squadrons, and particularly those of Brest and Ferrol, remained in port whole years when they should have been constantly at sea, only returning to port for supplies or after an action. We ought also to take into consideration the complete stoppage of all coastwise communications, which made it very difficult to supply and provision our ports.[100]

[100] "The distress of the ports was extreme; it was impossible to replace the anchor cables that had been carried away by heavy weather in the roadstead (1795)." "During the whole summer this obstinate blockade that reduces the port of Brest to extreme want is kept up. The fortunate arrival, on January 14, of a convoy from Nantes that succeeds in escaping the English cruisers is all that prevents a famine (1797)." "Until the abandonment of the plan of an expedition under Bonaparte, rope will be

One of the advantages, and not the least one, of the blockades was the moral ascendency that they gave to the blockaders. By everywhere rushing to meet the enemy, challenging him to combat, England showed her superiority and demoralized her adversaries. She did not hesitate to take advantage of this situation to diminish, in cases of urgency, the strength of her blockading forces.[161] The English ended by having such self-confidence that they ceased to take precautions any longer; they anchored in our roadsteads and set up their rigging there.[162]

Let us now consider the dangers that flow from the system of blockades.

All the English forces were scattered and isolated from one another, without power to sustain each other; so that if one of our squadrons succeeded in escaping and all trace of it was lost, it could fall unexpectedly upon one of the blockading squadrons of less force and free the blockaded ships; during this interval the detachments sent in pursuit in wrong directions would be wholly out of touch with the operations.[163] After that the whole system would go to pieces like a house of cards. England had the good luck to escape this danger, but she owed it only to the disorganization of our navy and to the deadly fear that her ships inspired in our admirals, which would tend to demonstrate to us that under normal conditions it would have been necessary to renounce blockading. Two examples will make us see this.

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lacking at Brest, and ships will remain unable to get under way because they have been unable to secure cables for their anchors." "Brest not receiving anything was now in straits (1799)." ("Le Blocus de Brest de 1793 à 1805," *Revue d'Histoire*, October, 1902.)

[161] The Dutch were the only ones who dared deliberately to offer battle to the squadron blockading the Texel (Camperdown).

[163] Admiral Ganteaume, at the instigation of one of his captains, considered taking advantage of this negligence to attack the English squadron in the anchorage of Douarnenez, but he did not carry out his plan.

[162] Thus Calder stays in the West Indies five months looking for Ganteaume, who was in the Mediterranean, and Bridport went to seek Bruix on the Irish coast. At the moment when Villeneuve left the Mediterranean, the order had been given to detach ten ships from the Channel to pursue him. If the order had not been countermanded as soon as it was known that Nelson had decided to go to the West Indies on his own responsibility, the forces that were watching Ganteaume would have been reduced to very little.

We have already seen that Bruix, after having left Brest without being followed by Bridport, appeared suddenly before Cadiz. Lord Keith was blockading Mazzaredo there. Bruix could oppose 25 ships to 18. Logically he ought to carry off a brilliant success. But it was needful to fight; he did not do it. Therefore, the maneuver had no serious consequences, but it might have had such, if 25 French ships had been able to beat 18 English ships.

Later, Villeneuve, who was returning from the West Indies after having escaped the blockade of Toulon, fell upon Calder, who was blockading Ferrol. The same disproportion of forces: 20 ships against 15. If Calder had been beaten, the blockades of Brest and Rochefort would have been broken, but he was the victor!!! Such a result is disconcerting.[104]

The situation of all these squadrons was so perilous that history has recorded the apprehensions of the English admirals. "Calder," wrote Collingwood, "is reduced to a skeleton."

At this period, everybody in France, Napoleon included, had complete contempt for the consequences entailed upon each side by the system of blockades. The current opinion was that the English were wearing themselves out in thus keeping the sea while we were maintaining our material in good condition. Certainly such perpetual cruising entailed excessive fatigue; certainly the ships were greatly taxed; but this cruising formed incomparable crews and officers. The monotony of this duty, the continual watchfulness, exasperated the men, but they engendered a state of mind that favored the Admiralty's designs. Each one saw the end of his sufferings only in a battle which, by suppressing the cause, would suppress the effect; an encounter came thus to be ardently desired. Thenceforth victory was assured.

Our squadrons, on the contrary, were worn out with inaction; the ships, manned by green crews, put to sea only to be the sport of the elements; the least bit of a gale reduced them to the state of wrecks. Between the crews of the two nations there was the

[104] Here is a third example that we have not referred to because it has not the same bearing. Admiral Willaumez leaves Brest on February 21, 1809, to break the blockades of Lorient and Rochefort. He succeeds, but allows the two hostile blockading forces to escape. Would he have done this if our ships had been as well handled as those of the English?

difference that exists between the newly enlisted soldier and the veteran whose arms are rusted and garments worn.

* * *

Blockades were not carried out everywhere in the same manner. At Brest, under Bridport and Cornwallis, the bulk of the forces remained off Ouessant, while a light squadron that was called the *In-shore Squadron* was stationed in the Iroise, pushing in as far as the narrow entrance and placing some vessels in the Bay of Douarnenez to watch the Sein Race. When the weather was fine, the fleet anchored at the entrance of the Iroise or at Douarnenez. Finally, a certain number of ships went periodically to an English dockyard to be repaired and resupplied.

When Nelson was charged with the blockade of Toulon, in 1803, he proceeded differently. He stayed off the port with all his forces during an entire month; then he withdrew to Magdalena to give his crews a rest, leaving only some frigates on guard. The line of conduct adopted by Nelson was perhaps imposed upon him by the circumstances; in any event, it was thoroughly accordant with the opinion he held concerning his rôle. He maintained, in his letters to the Admiralty, that his object was not to prevent the French from coming out, but only to fight them if they did come out. This way of looking at things was the correct one, for, if he succeeded in meeting our ships at sea and in destroying them, the question was settled in the Mediterranean, and the forces employed in blockading became available for other uses; but it was necessary, nevertheless, to maintain a sufficient guard not to let the blockaded force get wholly away. And this was not done.

On a first occasion Villeneuve was able to go out and to return three days later without being molested; and on a second Nelson went in a wrong direction to look for him. Therefore, Magdalena was a base too far removed from Toulon.

Moreover, it is not clear how frigates could cruise with impunity off Toulon without being supported by their squadron. There are always, in a naval force, vessels of speed greater than the rest; nothing would have been easier than to send out some ships at night, without lights, to bring the English frigates to a stand against the coast and to force them to fight. If Villeneuve

had persistently pursued the scouts that watched him during Nelson's absence, the latter would have had to take them with him whenever he withdrew to Magdalena. Nor does it appear that Villeneuve thought of profiting by the enemy's absence to go out and put his vessels through exercises which they certainly greatly needed before taking the sea.

* * *

With steam navies all thought of blockading disappeared. At first, no possibility was seen of making long cruises with vessels that had but a small supply of coal and whose machinery was frequently in need of overhauling. The blockade of a hostile port very near the English coasts, such as Brest, alone would have been possible; and it would still have been necessary to employ forces at least double those blockaded.

Long years passed thus, but a day came when English publicists, supported by politician admirals, gave warning that England was without defense. Pamphlets set forth the invasion of British soil, London besieged, the navy annihilated, etc.

It has always been enough to press the spring of invasion to open the purse of the islanders. Such was the origin of the enormous development of the English fleet. When they had ships, they took thought how to use them and quite naturally came back to the old ways that had proved their efficiency; but then a new element had to be reckoned with—the torpedo-boat.

This latter, when it first appeared, did not have very brilliant nautical qualities; scarcely could it quit the immediate neighborhood of the shore. Built to attack battleships by surprise, it had no chance of encountering them unless they themselves came within reach of its blows. Blockades were, therefore, particularly favorable to the employment of torpedo-boats, and, in purposing to watch our battleships, England risked losing her own. These considerations determined the construction of the flotilla of destroyers. But if danger from the torpedo-boat was thus diminished, it was not wholly removed; and the questions raised by the use of steam remained living ones, even though improvements in the economy of the machinery had considerably increased the radius of action of ships. The system of distant blockade, which is only an extension and perfection of Nelson's method, thus came into existence.

Here is what it consists in.

The blockading squadron takes for a base an anchorage defended against the approach of torpedo-boats, in proximity to the hostile coast. It detaches a flotilla of destroyers to cruise in the immediate vicinity of the blockaded port, supporting them with a few cruisers. Finally, a line of communications connects the fighting body with the advance guards, and keeps the former informed of the movements of the enemy.

Thus single ships that come to enter the port will run upon the cruisers; and, if the blockaded forces make a sortie in a body, they will be followed by scouts that will bring the squadron into touch with them.

It has even been said that England, to increase the rapidity of communications, has in view the laying of a cable one end of which would lead on board a vessel, or perhaps onto one of our sea-coast inlands.

A variation of this form of blockade consists in supporting the light vessels and cruisers by a battleship division that is periodically relieved.

Thus, for example, to blockade our Northern squadron in Brest, the English squadron would take the Scilly Islands as base of operations (it is said to be for this purpose that they have been made an advanced base); the destroyers would be stationed in the Iroise, and the cruisers between Ouessant and Sein bridge, with detachments in the Race and the Four; finally, a chain of scouts or a cable would connect the blockaders with their squadron.

Such, it appears (though we know nothing certain in this respect), are the ideas that are current on the other side of the Channel. But the carrying out of this program raises many objections; happily we do not lack means of opposing these ingenious arrangements.

As far as direct blockade is concerned, that is not to be thought of; though the battleships may be sufficiently protected from torpedo-boats by destroyers, to-day they must reckon with submarines, which will go to seek them much further than is commonly supposed. These latter will find it all the easier to show their power because, blockades being lengthy operations, it will be allowable to wait the most favorable conditions for attacking.

For the same reason, the idea of supporting the blockaders by a battleship division must be renounced.

The cruisers and destroyers will, therefore, find themselves face to face with all the blockaded forces. They will be constantly exposed to sudden sorties of the light squadron, supported by some battleships, and it appears doubtful that they would always succeed in withdrawing without losses. Moreover, even in the case we are considering, the submarines will have a part to play. Admitting that the destroyers may be safe from torpedoes (which is not proved), cruisers and scouts are not; and these vessels must anticipate being blown up.

Furthermore, will the English be able to take possession of an island on our coast to land a cable there? That would suppose a singular incapacity on our part. And how will they keep it, unless by protecting it with their entire squadron, which would mean direct blockade?

No, blockades will have no more fears for us when our flotilla of submarines has attained its full development. We might even welcome one, at the beginning of a war, to cut off from the hostile force some of its units, if there were not advantage in impressing upon the operations the desired direction by a vigorous offensive.

* * *

We cannot leave this subject without saying a few words concerning the blockade of Santiago by the American squadron and that of Port Arthur by the Japanese Navy.

Contrary to all precedents, Admiral Sampson distributed his ships on an extended line that doubled the cordon of light vessels and enclosed the narrow entrance of the harbor; that is, he established a military blockade upon the principle of commercial blockades.

It does not seem that this method ought to be retained. It had no serious consequences, because the Spaniards had made their minds up not to fight; but if they had fallen in a body on one end of the line, the Americans might have suffered useless losses.

Admiral Togo, on the contrary, carried out during ten months, and with full success, a distant blockade, such as has been defined above. He took as base the Elliot Islands, which are only 65 miles from Port Arthur, and, from this anchorage, he permanently detached his torpedo-boats and light vessels to maintain

a watch over the approaches of the port. The blockade was never absolute, in the sense that a few junks loaded with provisions succeeded from time to time in getting through the line of guards; but it was none the less effective as far as results go.

As the Russians had no submarines at Port Arthur, we see no reason for modifying our previous conclusions.

V.

Passages by Main Force.

The object of passages by main force is to get through the passes that give access to a harbor or river. The operation is always a daring one, on account of the concentration of defenses, and the greatness of the result alone can justify the sacrifices it entails.

Examples of this kind are not abundant; we will content ourselves with citing two that may be considered the most noteworthy.

To reach Mobile, Farragut was obliged first to reduce the outer works. A first attack being without result, the American admiral determined to force a passage into the bay. It was not his first essay of the sort, but the difficulties had never been so great.

On August 5, 1862, at 5.40 a. m., the Federal squadron got under way. Seven corvettes, each having a gunboat lashed to it on the port side, formed in column, with the corvette *Brooklyn* in the lead; immediately after her came the flagship *Hartford*. Four monitors formed a second column to starboard of the squadron and consequently between the latter and Fort Morgan.

We cannot give a better account of this passage by main force than by reproducing, in part, the official report of Admiral Farragut:

"It was only at the urgent request of the captains and commanding officers that I yielded to the *Brooklyn* being the leading ship of the line, as she had four chase guns and an ingenious arrangement for picking up torpedoes, and because, in their judgment, the flagship ought not to be too much exposed. This I believe to be an error, for apart from the fact that exposure is one of the penalties of rank in the navy, it will always be the aim of the enemy to destroy the flagship, and, as will appear in the sequel, such attempt was very persistently made, but Providence did not permit it to be successful.

"The attacking fleet steamed steadily up the main ship channel, the *Tecumseh* firing the first shot at 6.47. At 7.06 the fort opened

upon us and was replied to by a gun from the *Brooklyn*, and immediately after the action became general.

"It was soon apparent that there was some difficulty ahead. The *Brooklyn*, for some cause which I did not then clearly understand, but which has since been explained by Captain Alden in his report, arrested the advance of the whole fleet, while at the same time the guns of the fort were playing with great effect upon that vessel and the *Hartford*. A moment after I saw the *Tecumseh*, struck by a torpedo, disappear almost instantaneously beneath the waves, carrying with her her gallant commander and nearly all her crew. I determined at once, as I had originally intended, to take the lead, and after ordering the *Metacomet* to send a boat to save, if possible, any of the perishing crew, I dashed ahead with the *Hartford*, and the ships followed on, their officers believing that they were going to a noble death with their commander-in-chief.

"I steamed through between the buoys where the torpedoes were supposed to have been sunk. These buoys had been previously examined by my flag-lieutenant, J. Crittenden Watson, in several nightly reconnoissances. Though he had not been able to discover the sunken torpedoes, yet we had been assured by refugees, deserters, and others of their existence, but believing that from their having been some time in the water, they were probably innocuous, I determined to take the chance of their explosion.

"From the moment I turned to the northwestward to clear the Middle Ground we were enabled to keep such a broadside fire upon the batteries at Fort Morgan that their guns did us comparatively little injury."

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"With the exception of the momentary arrest of the fleet when the *Hartford* passed ahead, the order of battle was preserved, and the ships followed each other in close order past the batteries of Fort Morgan, and in comparative safety, too, with the exception of the *Oneida*. Her boilers were penetrated by a shot from the fort, which completely disabled her; but her consort, the *Galena*, firmly fastened to her side, brought her safely through, showing clearly the wisdom of the precaution of carrying the vessels in two abreast."

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"Our ironclads, from their slow speed and bad steering, had some difficulty in getting into and maintaining their position in line as we passed the fort."

The reports of the commanding officers attribute the comparatively small number of injuries to the rapid fire of the squadron and the smoke, and they note that the broadsides of grape delivered by several vessels as they passed close by the fort reduced entirely to silence the Confederate batteries.

The losses of the squadron amounted to 52 killed and 180 wounded, without counting the 120 men who went down with the *Tecumseh*.[165]

The dispositions taken by Admiral Farragut are noteworthy. Every naval force that may desire in the future to force a passage should draw inspiration from them.

Let us now consider the feat performed by two French gunboats, of wood, with no protection. I follow the account of the vessels' officers whom I had occasion to see a few days afterwards.

The *Inconstant* and the *Comète* presented themselves at the Mei-Nam bar, on July 13, 1893, on their way up to Bangkok. The *Inconstant* called for a pilot, and met with a refusal. The captain of the *Jean-Baptiste-Say*, a French steamer making regular runs between Saïgon and Bangkok, went on board to act as pilot and, as soon as there was enough water on the bar, the vessels stood for the mouth of the river.

At 4000 meters the Siamese forts opened fire. Commander Borie had not expected this attack; he could still have turned back, but he did not think of such a thing. His orders directed him to go up to Bangkok—he executed his orders. The masts were housed, magazines opened, and as soon as ready the vessels replied to the fire.

As they draw near the light-ship that marks the entrance of the river, a torpedo explodes ahead of the *Inconstant* without doing her any harm. The gunboats cross the bar and pass through the midst of the Siamese fleet drawn up in two lines.

Night falls.

The most difficult task had not been accomplished. It was still necessary to pass at 200 meters distance under the fire of Paknam fort, which is at mid-distance between Bangkok and the mouth of

[165] Grasset, *La Défense des côtes.*

the river. The *Comète*, which saw it first, fires a shot. The fort delivers its broadside too soon; the boats pass. At 9 o'clock they anchored off the French consulate. On the following day, at colors, they dressed ship in honor of the 14th of July. Two killed, three wounded.

Many officers think that under present conditions passages by main force are no longer possible. The *Inconstant* and *Comète* have given a striking denial of this. It may be argued, however, that they had affair with Siamese and that things would have happened differently with Europeans. We will be satisfied, therefore, with feeling proud of this feat of arms, without drawing conclusions from it.[166]

What basis exists for interdicting the forcing of passages?

Lines of torpedoes are a hindrance; they are not a prevention. It is true that they sunk one of Farragut's vessels; but all combats occasion losses, and the forcing of a passage is a combat; all that is asked is to be the victor.

Coast-defense cannon are more powerful than they were forty years ago; but ships are better protected, and after all batteries have no other armament than that used by ships in conflict with them. Let us not forget that it is not a question here of a regular contest in which the batteries must have the best of it, but of a rapid passage during which a hail of fire is poured upon the works to stop their fire momentarily. Well, ships are not annihilated as quickly as one juggles a pea. And then very little is needed for a torpedo not to explode at the moment or place intended, for a shell not to reach the mark. There will also be a certain period, at the beginning of the war, when all the batteries will not yet have been fully manned.

As a matter of fact, all passages by main force have succeeded. It would be absurd to conclude from this that all passages can be forced; let us be satisfied with allowing that the operation is not *a priori* impossible. All passages are not defended like the entrance of Brest or like the approaches to our naval arsenals; there are even some that have no lines of torpedoes.

Still, if Duguay-Trouin, after having cleared the narrow entrance of Rio-de-Janeiro, had not been sure of having nothing

[166] We may be permitted, nevertheless, to remark that had the conditions been different the government would not have taken the chance with unprotected ships.

more to fear for his ships, he would perhaps have given up the expedition; if the *Inconstant*, after having passed under the forts of the Mei-Nam entrance, had found at Bangkok batteries that it would have been necessary to reduce one after the other, she would without doubt have succumbed; if Admiral Courbet had not known that there was no interior defense abreast Fouchou arsenal, he would not have run into such a trap.

It is the inner defenses, therefore, those with which it will be necessary to undertake a regular contest, that will prevent the forcing of passages. The others will wound the enemy; these latter will finish him.

These considerations show us in what spirit the defense of our places ought to be organized. I insist upon it, because reason has not always been respected in the arming of secondary places.

FOURTH PART.

THE AUXILIARIES OF STRATEGY.

I.

The Plan of Campaign.

We have seen, in the first part of this study, that the manner of distribution of one's forces is not an immaterial matter, and that, for equal effort, the result varies according to the direction impressed upon operations. A well-matured plan of campaign is, therefore, necessary.

When war breaks out is not the moment for asking oneself what must be done. In the entire naval sphere each one will then be overwhelmed by the cares of mobilization; the central department will have to provide for imperious necessities and will be burdened with the solution of thousands of questions; no one will any longer have the calm and coolness indispensable for the complete working out of a plan of operations.

If, at this critical instant, nothing has been prepared; if there are no orders all ready; if, in a word, the whole machinery can only be set going by throwing everything out of gear, we shall be carried away by events in spite of ourselves and will rush our squadrons to sea, shutting our eyes to what happens.

To establish a plan of campaign, the general direction that it is wished to give to operations is first determined, with a view to securing the maximum effect. An outline is thus sketched, then the number and kind of forces necessary for carrying out the plan with chances of success are inquired into, keeping in view all the elements of strategy that are of a nature to strengthen the action of the ships.

These preliminary labors bring to light defective features, whether in the disposition of ships or in their strategical qualities. Thus the plan of campaign has an influence upon building programs and upon the characteristics of vessels.

As new units, designed upon a more rational basis, come into service, the work little by little is perfected. It is not enough to ask what can be done with the material at one's disposal; it is necessary that it be the material that is adapted to the conditions of war, as they spring from general laws.

The plan of campaign also has the advantage of connecting

together, with a view to a precise object, the different problems that, in peace time, seem to us to be independent of one another because they are studied separately. Thus we avoid attaching an exaggerated importance to operations that have but a secondary influence upon the final issue.

It does not seem to be difficult, if we do not let ourselves be taken unawares, to draw up a rational plan of campaign.[187] We have to guide us the advice of men of the greatest competence, and we have leisure to study the means at the enemy's disposition and the manner in which he can use them. Nevertheless, war constantly shows us enormous faults that are due much more to errors of principle than to a condition of inferiority. This results in the first place from generally not attaching enough importance to reflex actions, to the reactions that events have upon each other, which leads to making fruitless efforts that waste forces without any gain. But the initial cause of those queer conceptions that have no result comes from the fact that as much energy and moral worth are necessary to plan war as to carry it on. Radical solutions are generally repugnant, yet without such no success is possible; it is sought to conciliate opposing interests and diffuse plans are thus arrived at.

When France declared war against England in 1778, the government of Louis XVI was in possession of a plan of campaign to the elaboration of which a man of great worth, the Count de Broglie, had devoted twenty years of his life. Constantly perfecting his work, guided by the exclusive sentiment of the object to be attained, he had made something that could stand by itself. Well, during the war, on several occasions ideas were taken from this work, but without reflecting that they had no value excepting as forming part of the whole. Thus we had a badly built structure, because all that made it strong had been taken away from it.

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What is the part that belongs, in the drawing up of plans, to the principal agents of execution?

[187] It must be understood by this that it ought to be possible to secure the best utilization of one's forces; for, as far as results are concerned, the skill of the enemy has to be reckoned with, also faults in execution, and finally the balance of forces, which will always make the task difficult for the weaker side, and sometimes even impossible.

In China, Admiral Courbet was constantly obliged to follow a line of conduct that he disapproved; and the despatches that he received prove that the government had no very exact ideas about the economic and social situation of the Celestial Empire, any more than about the geographic conditions of those regions. These false ideas were the cause of our vessels and troops being uselessly wasted against Formosa.

The correspondence exchanged, before and during the Spanish-American war, between Admiral Cervera and the Minister of Marine, revealed a perpetual divergence of opinions between these two general officers, and it is very difficult to decide which of them was right. If, on the one hand, the minister's singular optimism testified to an absolute ignorance of the material that he had charge of, of the enemy's resources and of the elementary principles of war; on the other hand, the chief of squadron's everlasting complaints do not seem to have sensibly bettered the situation. Finally, Admiral Cervera had to yield with groans, which, it will be agreed, is not a guarantee of success.

Disagreements of this sort can have only fatal consequences. In principle, a chief ought never to be obliged to do what he thinks bad, because nothing is done well that is not understood. Moreover, all officers have not the same qualities, nor the same faculties rendering them fit for the accomplishment of all missions; only what they are capable of can be demanded of people. On the other hand, the departments, from which the plans of campaign emanate, have a tendency always to measure too nicely and they thus demand impossible things; situated far from the scene of war, they do not take account exactly of the difficulties of execution, because they lack means of estimating at its true value the coefficient of utilization of the naval forces. Everyone knows that at a distance things always seem easy and that assurance is lost in proportion as one draws near. Finally, the departments have no effective responsibility; if an operation fails, they are not the ones who go before a court-martial, and, in spite of themselves, this immunity influences their decisions and makes them demand things the execution of which they themselves would not accept. Quite to the contrary, he who is on the spot, who sees things close at hand and who risks his life, and above all his reputation, that one is prone to fall into the opposite excess and to

see obstacles everywhere. It is not everyone that, like Admiral Courbet, has an exact appreciation of the situation and of the advantages that can be drawn from it.

There is but one method of conciliating everything; that is to put everywhere, in the departments as well as in the field, *the right man in the right place*.

II.

Public Opinion.

Present-day governments have to contend with a very powerful adversary that sometimes will not leave off making the conduct of operations difficult. I mean public opinion.

It is well known that the public does not look upon war from the same point of view as professionals; its attention is turned aside by what is going on close at hand, and it perceives only vaguely the far-off horizons where the objective is hidden. Well, there is no use in saying that the notion formed by the masses as to the scope of operations is not the true one; if it were, the military art would not exist, and genius would be within everybody's reach. All that was powerful in Napoleon's campaigns only becomes apparent to us after the act, when occurrences have illumined our minds and revealed to us new aspects of which we would never have thought.

The public, when it estimates events, is much more solicitous of the evils that threaten it than of the object to be attained; military men, on the contrary, think that war, being an evil in itself, can engender only evil, and that the sole excuse for making it is to do so successfully.

This divergence of views determines from the beginning a misunderstanding between those who are spectators of the war and those who have the grave responsibility of directing it.

As soon as the first encounter takes place, the population loses its head, the journals constitute themselves the spokesmen of its complaints; the government is attacked, and the admirals are not let off. If, then, there is at the head of affairs a man who is not energetic enough to stand fast against the storm, or who is not capable of explaining his acts, because he himself does not know their scope, all the dispositions taken will be reversed. A poor arrangement will be adopted; sacrifices will be made to public opinion by giving over a part of one's forces in order to meet its views. It is known to be an error, but it is done all the same. It would be better not to wage war than to do so in such a way, for

what is the end of it all? Everything is compromised without satisfying the public; when defeat comes, it will no longer be possible to protect anything; therefore, it is only going back to start over again.

During the Spanish-American war, the influence of public opinion was manifested on both sides.

As far as the United States are concerned, the Naval Council thought itself obliged to divide their forces in order to satisfy the northern sections, which were unwilling to remain unprotected; and Mahan, who was a member of the Council, frankly confesses that this solution was absolutely contrary to military interests. No harm resulted from this, for the reason that the Spaniards did not think of attacking either the coast or the hostile ships; but, on the part of Spain, the public apprehension had more serious consequences.

What a sad history is that of that poor Spanish squadron! Blockaded in Santiago by superior forces, demoralized, it was destined to certain destruction if it went out. In Spain, the journals were wroth at such inaction; they did not comprehend that four cruisers, poorly armed, could not measure themselves against so many battleships, supported by several cruisers. Politics intervening, the squadron ceased to be anything but a means for battering down the government. At first the Minister of Marine put a good face on the matter. He explained to the Cortes that ships were not made to be destroyed; but his resistance was of short duration. He sent to Cuba the order to make the squadron go out and, in signing that order, he signed the death-warrant of his sailors.

Admiral Cervera's vessels were marked in advance with the seal of destiny. Nevertheless, would it not have been better to let them stay in port, thus preserving the single chance of saving Santiago, rather than to sacrifice them stupidly to the contentions of the press?

The tone of the sea-coast journals, during the grand maneuvers of 1889, gives us but a feeble idea of what will happen in case of war. Not a squadron will be able to go out of sight of shore without there arising cries of treason. And what will happen on the day when an admiral requisitions coast-defense vessels to take them with him?

What is the remedy for this state of affairs? To educate the

nation; to show it what its true interests are. There is nothing to conceal in the principles that govern warfare. What neither the enemy nor the public ought to know is only the manner in which it is intended to apply them.

Well, it is not impossible to form public opinion and to turn it in the direction of the general interests of the country. Admiral Colomb calls attention to the fact that the English people were never more tranquil than when their squadrons were at sea, because they had a sufficiently clear comprehension of the affairs of war to know that naval forces can only give protection by acting.

During the hostilities against Russia, the Japanese government was able to make the nation accept a line of conduct that, in France, would have raised recriminations without end and might have caused a modification of the plan of campaign.

III.

Preparation.

It is not enough to send one's squadrons out to fight; it is also necessary that they be of such strong composition that equality of numbers may secure equality and, if possible, superiority of strength.

Historians, who are principally concerned in recounting facts, distribute praise or blame among chiefs of squadrons according to the results of their encounters. Rarely do they take pains to inquire whether the means at the disposal of the vanquished permitted doing anything else than what they did. How many, among those whom fortune betrayed, would have left the reputation of skilful leaders, if they had only had means equal to those of their adversaries! It is very difficult not to commit errors when one finds himself disarmed by mediocrity of material and insufficiency of personnel; what it is needful to do is easily seen then, but it cannot be done.[168]

The humiliations of battlefields are but too often an effect whose causes are due to lack of preparation.

Between combatants of two hostile nations, there is frequently to be noted a different state of mind, which, by itself alone, is the best presage of the result of the struggle. On one side, the confidence that engenders courage and gives birth to bold plans; on the other, apprehension, mother of discouragement and of bastard solutions. This difference of moral state could have been observed between the Austrians and Italians, before Lissa; between the Japanese and Chinese, before the Yalu and Wei-hai-

[168] We do not assert that there have not often been, among the vanquished, leaders unequal to their tasks; but even this may be charged against bad organization. In a numerous body, there are always officers endowed with the qualities necessary for exercising the chief command; if squadrons are entrusted to incapables, it is because they have been placed there from considerations foreign to the good of the service—that is, because the organization is defective. When defeat results, it is these men that are blamed. This is wrong. They are not responsible; they have given the measure of their abilities. The guilty are those who chose them.

wei; between the Americans and Spaniards, before Cavite and Santiago;[169] between the Japanese and the Russians. The confidence on one side had its source much more in training than in numerical superiority, since the more numerous were not always the victors. The swagger with which admirals like Barrington, Hood and Cornwallis used to withstand the attacks of greatly superior forces[170] gives us a measure of the moral influence exercised by the consciousness of strength.

The naval greatness of a nation, therefore, depends principally upon the manner in which its forces are prepared and trained.

* * *

In this connection, it is well to call particular attention to the question of personnel.

The numerical insufficiency of crews was, in the past, one of the main causes of the weakness of the French Navy. Even during the American war, ships never had their full complements. It was much worse during the Revolution and Empire; the custom grew up of making up shortages of seamen with soldiers. Marked inferiority in gunnery was an immediate consequence of this.

To-day, the naval enlistment is functioning normally, and it is admitted that we have more sailors to carry on a war with than we need. It is possible; but what is certain is that in peace time we are still reduced to expedients. Crews never attain the regulation number, neither at ordinary times, nor during grand maneuvers,[171] in spite of the addition of reservists. Men of one specialty are embarked to take the places of those of another specialty, and it will be understood that that does not fill the bill.

The question of personnel in our navy has always been relegated to a secondary place: it is preferred to man more vessels and to man them badly. With reduced effectives, the old ways would reappear in a new form, like corpses that rise to the surface.

[169] See, upon this subject, Admiral Cervera's letters.

[170] Barrington, with seven ships, is attacked, at St. Lucia, by d'Estaing, who has twelve. Hood fights at anchor, at St. Kitts, with twenty-two ships against de Grasse, who has twenty-six (see Part I). Cornwallis, with five ships, has a running fight with Villaret-Joyeuse's whole squadron.

[171] During the grand maneuvers, the squadron had to stop at sea and send people aboard a ship that could not keep up.

The idea that has led to having ships that are manned and yet not manned is not without its attractions. With crews reduced one-half, the material is as well taken care of as in a condition of full armament; and as organized and enrolled forces are thus provided, it suffices to fill up the complements to make them ready to put to sea almost immediately, *if the depots are capable of furnishing the necessary contingent;* mobilization is reduced to its very simplest form.

The misfortune is that ships manned with reduced crews cannot cruise, and it is at sea that seamen and officers are trained. When the whole French fleet has to be mobilized, it will be necessary to call upon the reservists; all the more necessary is it that they be not joined to men whose experience has been confined to harbor work.

All historians agree in recognizing that the English crews were trained by prolonged blockades, and that Nelson's prodigious successes had their source in those cruises, while our ships, stationary in harbors, were like beings all of whose members are benumbed by inaction. Well, the vessels of our Northern squadron that, yesterday still, had only reduced crews, those vessels were blockaded, though only by their own state; they got under way only to have target practice, and were incapable of making a passage of any length. When, in the spring, they put to sea, they had crews that were afraid of the sea, borrowed officers, an admiral who perhaps knew how to lead his squadron, but who did not know what could be gotten out of it. When this squadron met with that of the South, as in 1900, the difference between the two forces was striking.

The system of reduced crews is dangerous; it gives the illusion of a state of preparation that does not exist. The further we go in reducing the length of military service, the more the complexity of our material increases (alas!), the more necessary it is to give our men sea experience. Well, vessels cannot go to sea without crews.

The normal complement of vessels is ample to satisfy all requirements; it would even be inconvenient to increase it during peace time; the men would no longer have sufficient occupation. But in time of war it would be advantageous to have an addition to the personnel, if it be true that we dispose of reserves for whom we shall have no employment.

The idea of forming on board ship supplementary crews who would serve, as far as required, to replace dead and wounded, has already been put forward. Perhaps the author of this project exaggerated its application; in any case it is regrettable that the principle was not preserved, with freedom to reduce it to the right proportions. It is difficult to admit that during a combat guns may be out of action for lack of men, while there are idle seamen on shore. But, setting fighting aside, there is a whole class of men whose number ought to be quite doubled at the very beginning of war, if it is wished to utilize all the resources of strategy. It is that of firemen.

Movement, as we have said elsewhere, is the soul of strategy. Well, the fireman is the soul of movement.

Our vessels seldom cruise with all their fires lighted. Solicitude to conserve the machinery and the allowances of coal allotted to squadrons do not permit making high speed frequently. The complements of firemen are calculated accordingly.[173]

When squadrons have power trials, the vessels have only to make a spurt, and an effort is then required from the whole fireroom personnel that could not be kept up; but when a single vessel has to maintain high speed for a long time on account of some special mission, it becomes necessary to send men from the deck force into the bunkers. Such conditions as this are not permissible in time of war.

It is well known that there are in the navy convinced partisans of speed, who imagine that it can make up for anything. This is an evident exaggeration, for, though speed can make force effective, it cannot take its place; but, after all, it cannot be denied that the faculty of moving rapidly from one place to another is an element of success. Well, it is necessary that it be known that our vessels, and particularly torpedo-boats, are incapable, under existing conditions, of doing their best on account of lack of firemen.

[173] There is no other navy in which machinists are so numerous and firemen so few as in the French Navy.

IV.

The Doctrine.

To build the ships that are needed, and no others; to give them the armament suitable to each and to equip them properly, it is needful to know what it is wished to do and how it is to be done; an aim and a doctrine are necessary.

How many millions would be saved every year, if we could come to an agreement, not about all types of ship (that would be asking too much in the existing anarchy of ideas), but merely about a single one. We would then have a vessel whose characteristics would be well defined, which would respond to a precise object and fulfil fixed conditions; each new unit would be but the improved reproduction of the preceding one. Then by specializing constructions by public and private shipyards, we should arrive at having a division of labor and an industrial organization that, according to some engineers, would procure a saving of 25 per cent; our naval strength would find itself increased by a quarter. While now each new ship represents a new work, new models, new installations, new principles, new bargains.

And progress?

Let us understand one another. Naval material is not the result of the more or less ingenious conceptions of various persons; it ought to derive from the needs of warfare. Therefore, all units of the same type ought to have points in common. Progress will not consist in always making something new; it will consist in perfecting the old. Thus we shall have more powerful guns on a less weight, stronger machinery in less space, more resisting armor of less thickness and, finally, better lines; but the general dispositions of the plan will remain the same. Neither is it necessary, on each new vessel, to turn all the arrangements upside down so that six months are needed to know one's ship.

Well, where can there be found any continuity in passing from the *Redoutable* to the *Suffren*, through the *Duperré*, *Formidable*, *Magenta*, *Brennus*, *Bouvet* and *Charlemagne*, without counting the *Réquin*, *Jemmapes* and *Bouvines?* They all have different forms, different systems of armor protection, a different battery arrangement, etc.

What happened, between the first and the last, that necessitated this incoherent diversity? Nothing, except that each of those who contributed to the bringing forth of these ships worked for his own account and had his own special point of view, without there appearing anywhere a guiding principle. Thus we have Mr. X's ship, Mr. Y's ship, ... but we are still waiting for the impersonal ship that meets the requirements of war. It is clearly to be seen that each constructor has sought the solution of a problem that interested him; usually he has found it; but he has remained outside of the question.

And so it is that our navy is composed of sexless vessels, the degenerate products of hybrid conceptions.

Seeing the usage that has been made of progress, one is tempted to believe that it sometimes marches backwards.

Where is progress when, beyond 17 knots, the *Masséna* wastes in vain efforts the power of her machinery? Where is progress when, after having abandoned on the *Bouvet* and *Charlemagne* the battery arrangement of the *Brennus,* it is returned to on the *Suffren?* Where is progress when there is thought of adopting to-day a form of conning-tower that was to be found on the *Gloire* thirty years ago. Does progress prevent coming to an understanding, once for all, as to the arrangement of piping, of auxiliary engines, of subdivisions, of the drainage system, of the handling of boats, of ventilation, of superstructures, of interior fittings?

What happens, in the midst of this anarchy? Just this,—as soon as a vessel is commissioned, line officers and engineers take possession of her to change her from top to bottom, and, until her death, this martyr to transformation will never moor off an arsenal without becoming the prey of workmen. They interpose, juxtapose, superpose; they add but never take away. Then the vessel sinks deeper, always deeper. After a few years, her armor belt becomes useless; sunk beneath the water, it no longer is anything but an enormous useless burden.

Each modification, taken by itself, seems to increase the value of the vessel; all joined together diminish it, because the ship, built to have fixed arrangements, does not accommodate itself to those that are afterwards added, and because each one pulls in his own direction without regard to harmony.

All this costs dear, all the dearer that the work is done under

uneconomical conditions, taking advantage of short stays in harbors to send on board workmen who lose half their time in coming and going. And it may well be asked if it would not have been better to utilize all our vessels, such as they were, and to devote all those millions to building new ones. Our naval strength would certainly have been greater than it now is.

Do you know what our mania for change cost us at the time of the Fashoda incident? The disability of six battleships, of an entire squadron! We could cite their names.

It is not necessary to be too exclusive: it must not be made a fixed principle not to touch a vessel any more after she has finished her trials.

Reconstructions, when they are carried out according to a complete plan in which everything is made to harmonize, can give renewed youth to old vessels of no value; but then it is needful to execute them at one time, and rapidly. Well, since vessels are periodically laid up by the need of new boilers, that is plainly the time to do other work on board. Except at this period, work should be limited to making repairs, and the moment of going into dock ought even to be waited for except when they are of an urgent character.

The complexity and variety of present-day material are such that vessels are no longer properly fitted out; it has become impossible to find one's way in the labyrinth. Some ships put to sea with their material incomplete; on others the arsenals mask their poverty by putting on board them rejected articles, made for other vessels, and whose sole use is to fill the blanks in the equipment sheets. And this distressful state comes from the fact that, nothing being interchangeable, not even the simplest objects, it is impossible to constitute storehouses that will function properly.

The coming into use of steam and steel, by turning our naval material topsy-turvy, must inevitably throw ideas into some confusion; but this disorder, the consequence of a period of transition, ought to have ended with the latter; and it has remained permanent. Yet it would seem that steam, armor, rifled cannon, and torpedoes are of sufficiently ancient date for the rules that ought to direct their employment to have been fixed upon. For fifteen years there has been nothing apparent that might have prevented the organization of our forces in a reasonable and economical manner; nothing except the absence of a doctrine.

There exist, nevertheless, general principles that are independent of new inventions, and that might have served as a guide. Here are some of them.

The power of guns is one thing; the intensity of their fire is another; one has no value without the other. If we allow ourselves to be hypnotized by power alone, we will build bigger and bigger guns that will naturally be less and less numerous. The preponderance of power will soon end in an absurdity, under the form of *Tonnerres and Caïmans.*

Speed is a factor in strength; but still it is necessary that it should not require an increase of personnel that vessels do not possess in regular service; otherwise one finds himself in the position of a capitalist who has a great fortune but whose possessions are sequestrated.

It is the same with the radius of action. The arrangement of bunkers ought to permit getting the coal to the furnaces; in war time the personnel will be worn out by constant vigils, and it will not be possible to employ it every day in transporting coal from one bunker to another.

Neither is the speed with which a vessel can fill up with coal a matter of indifference; it plays a part in military operations, and the author of plans ought to take account of it.

Supplying a fleet with ammunition is so much the easier as the material is less various. It is time, therefore, to put a curb upon this debauch of novelty that has cost us one hundred and twenty-eight different projectiles. Progress can perhaps manifest itself less continuously and proceed by successive leaps, so that before loading our shell rooms and magazines with a new projectile we may be sure of an appreciable advance. People do not seem to have realized the effect that this motley material will have upon strategy. It will interdict every displacement of forces because for each squadron there will be but a single port capable of renewing the contents of its magazines.

Nobody doubts the utility of armor; still it is necessary that its weight should be in proportion to the offensive power whose value it enhances. In the equation of displacement of a ship there is, therefore, a fixed relation between the two terms, protection and armament.

The ventilation of warships ought to take account of battle conditions; well, on certain battleships where the ventilators have

inlets on the battery deck, it has been completely lost sight of that the noxious gases from bursting shell will be drawn down into the engine and fire rooms and will compel their abandonment.

When the needs of taking stations for battle require the presence of ten persons in a conning-tower, it is regrettable to be able to accommodate only half that number.

Finally, simplicity and strength are two military factors whose importance is often preponderant.

Considerations of this sort apply not only to the interior organization of a ship, but also to the part it is intended to play.

It has never been considered doubtful that the light vessels which radiate from squadrons should have a radius of action superior to that of the force to which they are attached. All the scouts of *Condor* type, which are incapable of keeping the sea as long as a battleship, are, therefore, only dead and useless capital.

These observations could be continued indefinitely.

Whence comes it then that it has taken several generations of ships to elucidate a part of these questions, and that others still remain without solution?

In the first place, uncertainty of ideas: we shall never possess a material appropriate to the conditions of war so long as we do not know exactly how it will be employed. Then, from the application of a defective method. In the conception of a ship, there are two different points of view to consider: power and efficiency, theory and practice. Well, all the anachronisms we have pointed out merely reveal the struggle between these two factors, a struggle in which power tends always to absorb efficiency because it manifests itself more directly to the eyes of the constructor. Efficiency, on the contrary, is a modest personage whose qualities only reveal themselves after much acquaintance. But to obtain a harmonious product, these two rival elements must be joined together.

Before undertaking to lay down a ship, therefore, a sort of list of conditions ought to be drawn up that would not only indicate its characteristics, but would show under their various aspects the elements of efficiency and would impose absolutely such solutions as were already acquired.

The day when this ideal shall have been attained, a progress will have been realized much more important than that which consists of doing the opposite of what has been done before. We

shall then be guided by a common idea that will economize much money and much labor.

There is complaint, and with good reason, that the French Navy takes five years instead of two to build a ship, so that vessels are out of date before entering active service. The reason for this is quite simple: the workmen who build our fleet are the same who worked on the tower of Babel.

* * *

This confusion would not exist if we had a doctrine. But what is this famous doctrine then?

It is the bond thanks to which all those who participate in a common work act in accordance with common ideas and principles. If we do not possess this connecting-link, each will act according to his own inspirations; and there are a great many chances against hitting on the true solution. For, as we have already said, war is not a matter of improvisation; it is something to be learned. It is subject to very definite laws that disengage themselves from the results of previous struggles; and it is this aggregate of rules that constitutes the doctrine.

Some fifteen years ago the navy was flooded with articles and anonymous pamphlets whose authors thought they were inventing naval war. Under the pretence of modernizing military science, they assumed to free themselves from the past; and they did not perceive that they were thus making war as children do when they amuse themselves with lead soldiers. It was they who preached that scattering of our forces which the Minister of Marine has called a sanitary cordon, and who thought they had found the true formula when they had placed a fraction of our forces everywhere where the enemy could appear. What remains of these lucubrations to-day, in the realm of ideas? Scarcely a memory, because they did not rest upon a solid base. But as far as our material is concerned, the influence of these amateurs has been considerable. Nobody had set forth the principles of naval warfare, and we had no doctrine to oppose to these childish conceptions. The result was that the public adopted them, and they had sufficient effect to give a trend to our naval construction that has fatally damaged the navy.

Fortunately, the War College, newly created, came to act as

counterpoise; and little by little the doctrine has emerged from the teaching of this school. Well, its mere existence sufficed to arrest the development of ephemeral ideas; for its teaching does not rest upon affirmations, like works of pure imagination, but upon demonstrations. It is for this reason that the doctrine takes a long time in developing and requires the co-operation of a succession of professors each of whom brings his contribution to the common edifice. The building is already well advanced, and it must be said that the exclusive credit for it belongs to the War College, whose teachings have spread even outside of the navy; we have had proof of this in the discussion of the naval appropriation bill.[173]

We can, therefore, face the future with confidence; for the moment we have to liquidate a past whose debt is very heavy.

* * *

We possess all the elements necessary for constructing as well and even better than no matter what nation; our sea-coast population, so devoted, is capable of supplying incomparable crews. What we have lacked is guidance. We do not succeed in agreeing as to what we need; and thenceforth it becomes impossible to introduce the spirit of continuity into our organism.

The English admirals are not those who built up the naval power of their country. If England has had Rodney, Hawke and Nelson, we have had Duquesne, Tourville and Suffren. It is that impersonal being that is called the English Admiralty; it is that which has prepared all the elements of British greatness; it is that which has known how to create homogeneous fleets, to arm them, equip them, enlist crews for them (God knows at the price of what sacrifices); to place at their head the most capable men. Its severity has often been excessive; but, in exchange, it has never haggled with admirals for its support.

What a spectacle the French Navy afforded us during this time! Directed alternately by men of genius and by incapables, it described a sinusoid, passing alternately from greatness to

[173] In this discussion, M. Bénazet has done me the great honor of quoting me as professor of strategy at the War College. It is all the more pleasant to render homage to the professors of this school that I have only been there as a pupil.

nothingness.[174] While army officers, such as d'Estrées[175] and d'Estaing, commanded its fleets, men like La Motte-Picquet and Suffren remained in subordinate positions. But what was most fatal was letting ourselves be dazzled by the charm of figures, seeking number without strength. Hence those squadrons that put to sea with incomplete crews, an incomplete armament, incomplete supplies. In brief, under the Monarchy, indifference or ill-will; under the Revolution, anarchy; under the Empire, impotence.

To-day, it is another affair. The magic of words has replaced the magic of figures. We have a scientific school that integrates war. From all this jumble, vague formulæ disengage themselves: defensive, police of the seas, coast defense, commerce destroying. All this while war is forgotten, that work of force and destruction; war, with its laws, its necessities, its exigences. Each wishes to dress the navy in his own fashion, and, adding a piece to its cloak, contributes to dressing it out like a harlequin.

A Minister of Marine, contemplating all this disorder, cried out: "Our fleet is a fleet of samples." The phrase, struck like a coin from the die, has remained—the thing also.[176]

[174] But for the Knights of Malta, who furnished France with a permanent reserve of officers, the navy would never have been able periodically to raise itself from its ruins.

[175] It is not necessary to be acquainted with naval history to baptize ships with the names of d'Estrées and d'Estaing.

[176] The institutions, traditions and social condition of a country often have an unexpected reaction upon military history. In the eighteenth century, the system of storehouses, so opposed to the mobility of armies, was a consequence of the method of recruiting of that period; it gave rise to prejudices and traditions still more fatal. Linear tactics itself arose from the necessity of always keeping the mercenary troops under the immediate authority of their leaders.

There were facts of the same kind in the old navy. The prejudice of birth caused commissions as officers to be given to people who had no sea experience. The defective enlistment of crews was connected with the social state of the realm. In the matter of tactics, we shall point out in a subsequent volume the conventions that perverted its spirit.

Even to-day the influence of considerations foreign to war makes itself felt. It will be enough to cite two examples of this.

Any seaman who knows the principles of the composition of squadrons, unless blinded by custom and tradition, would be astonished to see the *Formidable* at the head of coast-defense vessels that have absolutely different characteristics. Yet that is what could have been seen only a few years ago. This assemblage was the very negation of the good utilization

of forces. Every one understands this, but tradition requires that a vice-admiral shall fly his flag on a battleship of large size; so much the worse for tactics and strategy.

It is agreed that torpedo-boats ought to be commanded by young officers. The conditions of life on board them can only be supported by the insouciance of youth, while the adventurous side of their sort of attack requires that its character shall not have been too deeply considered. Well, since their creation, three mobile defences (those of Algeria, Tunis and Corsica) have been monopolized by old lieutenants. It is wholly a question of money. These commands are allowed table expenses, and officers who have only their service to make the most of must have reached a certain age in order to have a share of this earthly manna.

When, in a military organization, acts are no longer in accord with principles, disorganization is near at hand.

V.

Grand Maneuvers.

The grand maneuvers have been of incontestable advantage to the navy. They have been the means of stirring the torpor of our squadrons, which, without them, would waste away in inaction, since they have been deprived of the coal and personnel necessary for cruising. It is only during these periods of activity that some of the necessities of war can be taken account of. They train crews and officers; they show commanders that in war time they will be obliged to give over a part of their authority in order to rest, while, during short sorties, they assume to do everything themselves. From all these points of view there is only benefit to be derived from annual maneuvers.

As far as strategy is concerned, they furnish indications rather than conclusions. The sole fact that the guns are not loaded gives the operations a conventional form. When it is sure that an encounter with the enemy will not have irreparable consequences, it costs nothing to attempt the most unlikely adventures; and the rules that impose themselves immediately one risks the fate of his ship are thus deviated from.

It is above all exercises of getting and keeping contact that are given a false aspect by the fictitious character of maneuvers. It can be foreseen that when shell are fired a new light will be shed upon the conclusions of times of peace.

The frequency of attacks upon batteries seems, for example, to indicate that naval material could be freely risked in an operation of this sort, whereas the Chinese-Japanese, Spanish-American and Russo-Japanese wars seem to prove the contrary. Moreover, the fashion in which these attacks have sometimes been conducted leads to the supposition that what is sought is less to extinguish the fire of the batteries than to be safe from their shots, in which case the only logical conclusion is that it would be better to abstain altogether.

But a greater danger comes from the choice of themes when they are false *a priori*. They then reveal regrettable tendencies and completely falsify the spirit of the maneuvers. Admiral Aube,

to whom belongs the honor of having introduced these annual tests into our navy, would be greatly astonished, if he were living, to see the use that has been made of them.

At a certain period, the question of protecting the coast with a force superior to the enemy's could not be escaped from. What was sought to be proved? That the principal rôle of the navy is coast defense? Or even that we have no better use to make of our forces than to immobilize them along the coast, even with numerical superiority? The result has been to spread abroad false ideas that some day will return to trouble us.

The officers themselves are influenced by these dangerous practices. By repeating indefinitely the same exercises, they end by persuading themselves that things ought to be just so; that they cannot happen otherwise; and this impression becomes a part of them without being discussed. The day when one passes from convention to reality, one quite naturally recurs to giving the same solution to the same problems.

It is important, therefore, to put in practice only likely themes, and to apply them in a likely manner.

Thank heaven we are speaking of a time already long past; in the periods when the fleet was formed, the importance of the effectives permitted enlarging the circle of combinations, and it was sought to elucidate questions of greater interest than the everlasting coast defense; but, there again, the details of execution brought out regrettable consequences.

The cycle of our maneuvers is not yet closed. Many points upon which there is need of throwing a ray of light still remain obscure. For example: there have already been several attempts to break blockades; but it ought first to be ascertained if they are still possible with submarines in existence, and under what conditions.[177] Commerce destroying itself also affords a vast field for investigations. Almost nothing is known of the problems that its application raises; hitherto it has only been pointed out to us through economic considerations that relegate it to the domain of pure theory.[178]

[177] This exercise can only be productive if it lasts long enough to put the destroyers to the proof and if it includes periods of calm and of bad weather.

[178] Ought commerce destroyers to act singly or in groups? In the latter case, how should they cruise? At what distance will they distinguish

Finally, it has been so much repeated that it is possible to assure the protection of the coast solely with flotillas of torpedo-boats and submarines that it is time to justify the assertion. We possess in the Mediterranean numerous defense flotillas and a veritable fleet that would be capable of playing the part of assailant. We, therefore, have in hand all the elements needed to clear up this question.

For a long time yet we have plenty to give an always new interest to our maneuvers.

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a merchant steamer from a hostile cruiser? Will this distance be sufficient to permit escaping? How long will it take to visit a vessel? What should be done with vessels that are captured? Will not the time lost in visiting vessels allow cruisers to interfere with the operations of commerce destroyers and to endanger their safety? Will visiting be kept up at night? If so, how may unlucky encounters be avoided? How long will it take for cruisers to clear a region of commerce destroyers?

VI.

The War Game.

In default of grand maneuvers, the war game, which is within the reach of all purses, can be employed; with it the whole fleet can be mobilized and an unlimited duration can be given to operations; but it should be used with discretion.

From the tactical point of view, distractions of this sort ought to be repudiated. Battle depends wholly upon the intelligence of the commander; and tactics is only the slave of this intelligence. Well, it is impossible, with toys, to approach even remotely to the reality; and there is risk of warping one's judgment by taking what is only a game seriously.

In strategy, on the contrary, the war game can render some service. Thus, it will show, better than maneuvers, what becomes of scouting lines as soon as narrow seas are left. But it must not be forgotten that on the board the sea is always calm; vessels can always give their full speed without ever suffering from scale in the boilers; in short, damages to the machinery need not be feared. Here again general indications must be sought rather than precise conclusions.

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WASTED HORSEPOWER AND ECONOMICAL TRIM.

By LIEUT.-COMMANDER WILLIAM RUSSELL WHITE, U. S. Navy.

Occasionally it is demonstrated to the public, when ships make less than their designed speed on the originally calculated power, what engineers and constructors know so well—that theory and empirical formulæ are weak supports; more often such proof is given by the necessity of developing far more than the designed power in order to make the required speed.

There must be something fundamentally wrong with the present system of steamship design when from carefully designed warships such varying results are obtained, and of which a few are noted below:

(a) The *Good Hope* class of armored cruisers in the English Navy failed to make their maximum contract speeds as economically as was afterwards done when their propellers were changed.

(b) In order to make her contract speed, it was necessary for the protected cruiser *Charleston* of our navy to develop about 29,000 horsepower instead of the 22-000 horsepower which her designers expected would be all that was necessary to make 22 knots. Her propellers have been changed twice, so the *Charleston* is now wearing her third set, and with little or no reduction of the enormous excess horsepower to make the maximum speed.

(c) Unaccountable excesses in speed and in horsepower are sometimes developed on contract trials, as was done by the sister battleships *Kearsarge* and *Kentucky*.

(d) The sister battleships *Alabama* and *Illinois* developed more speed and power than designed, though to a lesser extent than the *Kearsarge* and the *Kentucky*.

(e) The sister battleships *Minnesota, Louisiana, Vermont* and *Kansas*, to make 18 knots, used respectively 15,000, 15,850, 16,45c and 18,950 indicated horsepower.

(f) The sister armored cruisers *North Carolina* and *Montana* had to develop from 26,500 to about 28,000 horsepower to make 22 knots, though the original designs called for 23,000 indicated horsepower to make this speed.

Many more such examples could be cited.

Why are these differences?

Instead of being a matter of course, it is, in fact, always especially remarked and advertised by the contractors if a ship makes the required speed on her contract trial; and especially so when the power then developed closely approximates the designed power.

In spite of all efforts to avoid previous errors, and regardless of every endeavor to benefit by past experience, the successful designers of ships and their machinery must accomplish many of their results by a set of rough thumb rules.

There have been several important series of experiments carried on by men of international reputation in ship building and engineering circles in reference to underwater bodies of ships and propellers and the power necessary to make certain speeds. If we accept the statements of facts in the preceding paragraphs marked (a), (b), (c), (d), (e) and (f), then the only conclusion to be drawn is that the results of such experiments were not binding on the designers or else the latter gave little weight to such data because of its incompleteness.

There is a crying need of data for all classes of ships, and designers of marine machinery and constructors of hulls are seriously handicapped in their endeavors. Guesswork, hobbies and suppositions have a weight in determining the shapes of hulls, of propellers and of power to make the speeds wanted that would make the tax-payer and the average ship-owner gasp, did they but realize the meager system of data used as the basis of designs. As yet, nearly a century since steamships were first used, there is no accumulation of data which, when used, will determine absolutely the exact power required to drive any given under-water form through the water; nor is there any compiled data which allows the correct and exact determination of the pitch, the diameter and the surface of propellers in order to apply this exact power economically.

Of course, there are certain empirical formulæ which are used in default of something better; and it is generally known among

ship-builders that, for certain purposes, a particular shape of under-water body is more economical or faster. To accomplish the same purposes, similar hulls are copied, because there is not positive information to show that another form would give better or same results at less cost.

There are many thousands of ships built and building, and it seems incredible that tax-payers and business men do not compel ship-building to become mathematically exact. Certainly some efforts should be made to acquire enough data so that predictions can accurately be made of the power required to drive at all speeds up to the maximum a given under-water form through the water. This is especially true of our navy, where succeeding ships in the same classes have similar shapes.

Certain men appear to have discovered for themselves the best or most efficient form of under-water body for the fast racing yachts, but such information is closely guarded as a trade secret.

Propellers for driving ships through the water are almost as much a mystery now as when first introduced, and to-day various theories prevail as to the best type to be used on ships having similar under-water bodies.

Most propellers at present fitted to the ships of our navy were designed from the results of the performances of sister ships combined with empirical formulæ derived from various experiments. Within limits the guess of any one engineer seems to have had as much weight as another, and in many cases there are wide discrepancies. It is a matter of record that experienced and successful battleship builders proposed, and did attempt, to install on a battleship of 12,500 tons displacement, intended to make 18 knots speed, the same propellers as were fitted to a battleship of 10,288 tons displacement intended to make about 16 knots speed.

In the earlier days of our modern steam navy, reliable knowledge and dependable skill were rarer, but as ships after ships of the modern type have been commissioned, many men have gained experience and acquired knowledge, and they demand greater efficiency on a given displacement. But the maximum possible efficiency is unobtainable when absolute data of horsepower for various displacements and different trims at progressive speeds is not in existence, even for one class of ships having similar under-water bodies.

Somebody or some organization, sometime and somewhere, will

begin the systematic collection and compilation of this most important data in order that ship-owners' moneys may be expended economically. "It is up" to the American Navy to make the start so that in the future it cannot be said that our men-of-war are mere copies and that we have not done our share in the promotion of progress. American minds can contribute to the science and art of ship-building as of old and to the economical powering and steaming of ships. Let us determine that the American-built steamers of the future shall be famous as were the clipper-sailing ships of the past.

To do this there must be the best sort of mutual co-operation—strong team work—of all the corps of the navy and of all officers doing line and engineering duties.

Believing this to not be impossible, it is therefore suggested that the following six points be investigated and accurate results ascertained for all the different kinds of under-water bodies, using in the beginning the material now built and in use.

1st. Trim: Discovering the "Economical Trim," thereby saving the continual but enormous loss of "Wasted Horsepower."

2d. Pitch of Propellers: Discovering the "Economical Pitch" by increasing or decreasing the pitch of propellers now in use.

3d. Area of Propellers: Discovering the "Economical Area" by increasing or decreasing the area of propellers now in use.

4th. Diameter of Propellers: Discovering the "Economical Diameter" by increasing or decreasing the diameter of propellers now in use.

5th. Having secured the 2d, 3d and 4th points immediately above, obtain the limits of revolutions of the "Economical Propellers" of various diameters, pitches and areas beyond which it is unwise to go on account of cavitation.

6th. "Errors of Models" used in the experimental basin, so that from them an average "Error of Model" may be obtained, by which to judge the performances of any shape of model sought to be tried.

It is realized that the first cost of doing all this work immediately and at one time would be prohibitive, but there ought to be a system and plan of work laid out to cover a long course of years, which will be followed by our ships and their officers. Then time and money will not be wasted in the future as it has been in the past.

Determine for all time each fact in order, and then proceed to the next, so that the coming generations will gratefully feel the effect and not be hostilely critical of our expenditures of time, money and energy, as surely will be the case if present methods are not improved.

Formerly, in the days of sailing ships, men were very careful to ascertain the trim at which a sailing ship would make the greatest speed—whether it was better to have their ships trimmed down by the stern or by the head, and if so, how much. Of course, they were assisted in arriving at what they termed the correct result by the experience of hundreds of years; but even so, the proper trim was in many cases a matter of individual judgment, because exact data were unobtainable.

There is much time devoted to developing the shooting efficiency of all our ships, but where is the time that should be set aside to ascertain what the economical steaming conditions are? There has been too much of the haphazard in this, though we have methods of obtaining, at given speeds, the exact power required to drive a ship of a certain under-water form, having any reasonably predetermined trim, over several standard mile courses where the depth of the water is known.

To-day one hears very little about the best trim of a modern man-of-war, in order economically to make any given speed up to the maximum.

Contractors apparently have been allowed on the contract trials to run the new ships at any trim. Should they not be required to run them at the same trim then as the ships will have when in commission and full of stores, coal, water and ammunition? When our modern men-of-war are delivered by the contractors, the trim, as it happens to be, seems to be accepted as a matter of course.

Ships in commission and displacing 1000 or 1500 tons more than when running their contract trials often equal or exceed the contract speed. And no reasons are usually given; but certainly there are causes for such astonishing results! Why is it that these increased displacements, in such a large number of cases, make such small differences in speed on full-power runs?

In comparing sister ships it should be noted:

(a) That the *Missouri* trims by the stern and the *Maine* by the head, and the *Missouri* made more speed on her contract trial; and since then has always made more speed on full-power runs than the *Maine*.

(b) The *Illinois* trims more by the stern than does the *Alabama* and the *Illinois* habitually steamed more economically and also faster on full-power trials.

(c) Taking the *Louisiana* class of battleships, the one down most by the stern required least horsepower to make 18 knots and more power was required as the trim by the stern decreased.

(d) The following table shows for the U. S. S. *Montana* the difference in data:

1st. When that ship trims 7⅜ inches by the stern.

2d. When that ship trims 5¾ inches by the head;

the screws being the same both times and the displacement differing but 345 tons. The *Montana* was docked in December, 1908, four months after this data was taken, and the bottom was then found to be almost clean, having but little grass and but few barnacles, and they small:

TABLE I.

	Draft for'd.	Draft aft.	Draft mean.	Trim inch.	Displ. Tons.	I.H.P. M.E.	Rev.	Speed.	Bot.	Date.
Contractors..	24′8 5/16″	25′4 7/16″	25′ 1/4″	+7⅛″	14,537	26,868	122.17	22.2	Clean.	Apr., '08
Ship's Com...	25′9¼″	25′4″	25′6⅛″	−5½″	14,882	27,279	118.4	20.55	Clean.	Aug., '08

It will be noted that, although the ship's force developed 411 horsepower more than the contractors, yet because of bad trim, 3.77 less revolutions per minute were made with consequently slower speed: the coal consumption was about the same. Consider the loss in power and speed caused by improper trim!

(e) The *North Carolina* shows similar data to that in paragraph (d) above. Consider her loss in power and speed caused by improper trim!

Since November, 1901, the U. S. S. *Kearsarge* has in various years standardized many times. The data of six of these on three different standard mile courses are given below in Table II:

From the data in the above table the curves in Plate I are drawn.

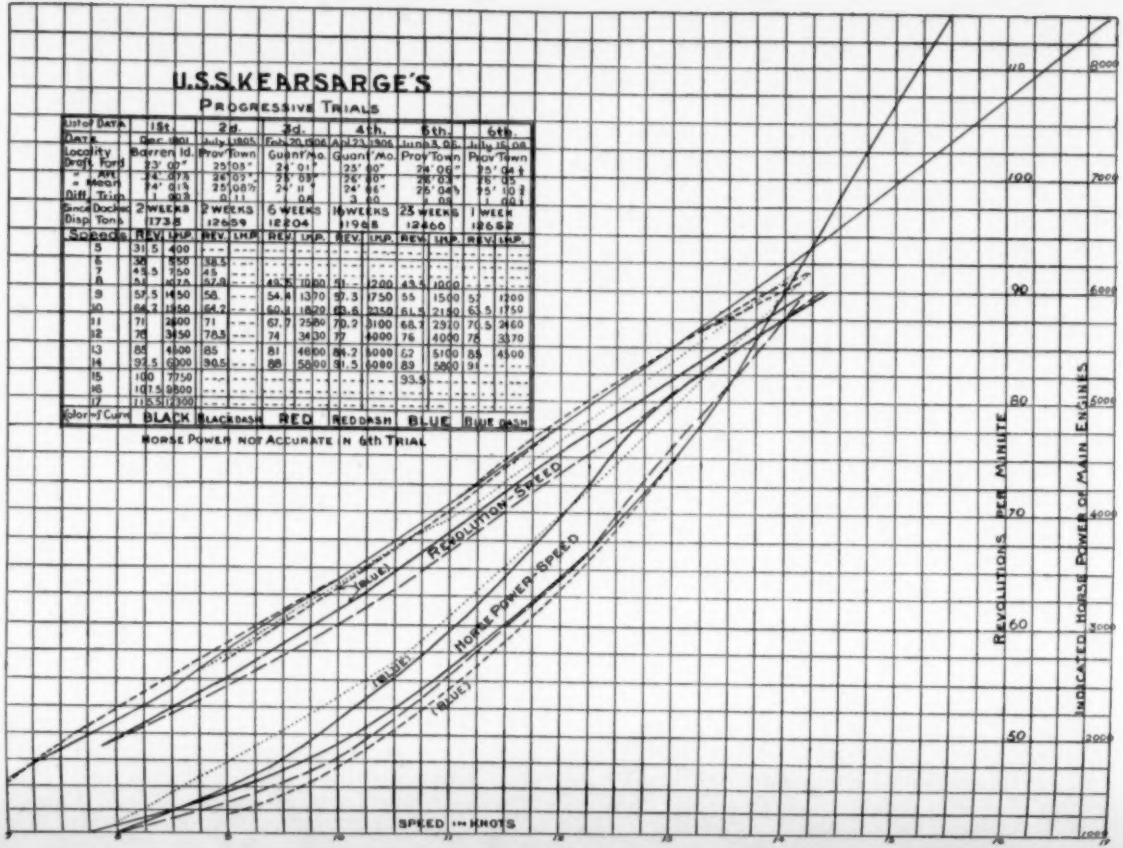
Of course, in any sets of observations and tables taken by different sets of men at different times many errors must enter, but the general conclusions to be drawn are as follows:

(a) When the *Kearsarge* is at, what for lack of a better name may be called the "Economical Trim," changes in displacement, even as much as 900 or 1000 tons, do not apparently seem to require a noticeable increase either of horsepower or of revolutions.

TABLE II.

TABLE II.

	First.		*Second.*		*Third.*		*Fourth.*		*Fifth.*		*Sixth.*	
Date	Dec., 1901.		July 1, 1905.		Feb. 20, 1906.		April 23, 1906.		June 3, 1906.		July 16, 1906.	
Locality	Barren Island.		Provincetown.		Guantanamo.		Guantanamo.		Provincetown.		Provincetown.	
Draft for'd	23′ 07″		25′ 03″		24′ 01″		23′ 00″		24′ 06″		25′ 04½″	
Draft aft	24′ 07½″		26′ 02″		25′ 09″		26′ 00″		26′ 03″		26′ 05″	
Draft mean	24′ 01½″		25′ 08½″		24′ 11″		24′ 06″		25′ 04½″		25′ 10¾″	
Difference trim	12½″		11″		1′ 08″		3′ 00″		1′ 09″		12½″	
Time since docking	Two weeks.		Two weeks.		Six weeks.		Sixteen weeks.		Twenty-three weeks.		One week.	
Displacement in tons	11,738		12,659		12,204		11,965		12,466		12,852	
Speeds—	*Revs.*	*I.H.P.*	*Revs.*	*I.H.P.*	*Revs.*	*I.H.P.*	*Revs.*	*I.H.P.*	*Revs.*	*I.H.P.*	*Revs.*	*I.H.P.*
5	31.5	400	....	....	....	....	....	....	....	....	....	....
6	38.	550	38.5	....	....	....	....	....	....	....	....	....
7	45.5	750	45.	....	....	...	....	....	...	....	....	....
8	51.	1075	51.9	....	49.5	1000	51.	1200	49.5	1000	....	....
9	57.5	1450	58.	....	54.4	1370	57.3	1750	55.	1500	57.	1200
10	64.3	1950	64.2	....	60.1	1820	63.6	2350	61.5	2150	63.5	1750
11	71.	2600	71.	....	67.7	2580	70.2	3100	68.7	2970	70.5	2400
12	78.	3450	68.3	...	74.	3430	77.	4000	76.	4000	78.	3370
13	85.	4500	85.	....	81.	4600	84.2	5000	82.	5100	85	4500
14	92.5	6000	90.5	....	88.	5800	91.5	6000	89.	5800	91.	....
15	100.	7750	....	....	....	....	....	....	93.5	....	....	....
16	107.5	9900	....	....	....	...	....	....	....	....	....	...
17	115.5	12300	....	....	....	....	....	....	....	....	....	...



List of Data	1st.		2nd.		3d.		4th.		5th.		6th.	
Date	Dec. 1901		July 1905		Feb. 20, 1906		April 23, 1906		June 8, 06.		July 18, 06	
Locality	Barren Id.		Prov'Town		Guant'Mo.		Guant'Mo.		Prov'Town		Prov'Town	
Draft, Fwd	23' 07"		25'05"		24' 01"		25' 00"		24' 06"		25' 04½	
" Aft	24' 07½		26'03"		25' 09"		26' 00"		26' 03"		26' 05	
" Mean	24' 07½		25'08½		24' 11"		26' 00"		25' 04½		25' 10½	
Diff. Trim	1 00½		0 11		0 08		3 00		1 08½		1 00½	
Since Docked	2 WEEKS		2 WEEKS		6 WEEKS		16 WEEKS		23 WEEKS		1 WEEK	
Displ. Tons	17338		12659		12204		11988		12466		12652	
Speeds	REV.	I.H.P.	REV.	I.H.P.	REV.	I.H.P.	REV.	I.H.P.	REV.	I.H.P.	REV.	I.H.P.
5	31.5	400	---	---	---	---	---	---	---	---	---	---
6	38	650	38.5	---	---	---	---	---	---	---	---	---
7	45.5	1150	45	---	---	---	---	---	---	---	---	---
8	54	1675	52.8	---	49.5	1080	51 -	1200	49.5	1000	---	---
9	57.5	1450	58	---	54.4	1370	57.3	1750	55	1500	52	1200
10	66.2	1950	64.2	---	60.1	1820	63.6	2350	61.5	2150	63.5	1750
11	71	2600	71	---	67.7	2580	70.2	3100	68.1	2920	70.5	2460
12	78	3450	78.5	---	74	3430	77	4000	76	4090	78	3370
13	85	4600	85	---	81	4800	84.2	5000	82	5100	86	4500
14	92.5	6200	90.5	---	88	5000	91.5	6080	89	5800	91	---
15	100	7750	---	---	---	---	---	---	93.5	---	---	---
16	107.5	9800	---	---	---	---	---	---	---	---	---	---
17	115.5	12300	---	---	---	---	---	---	---	---	---	---
Color of Curve	BLACK		BLACK DASH		RED		RED DASH		BLUE		BLUE DASH	

PLATE I.

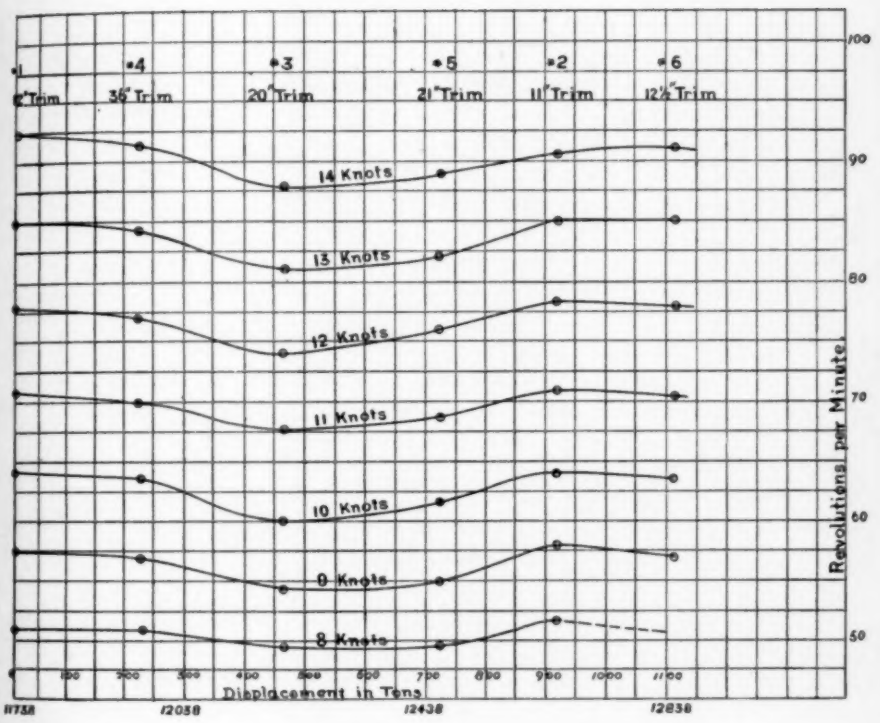


PLATE II.

Plate II shows the displacement-speed-revolution curve of the *Kearsarge*.

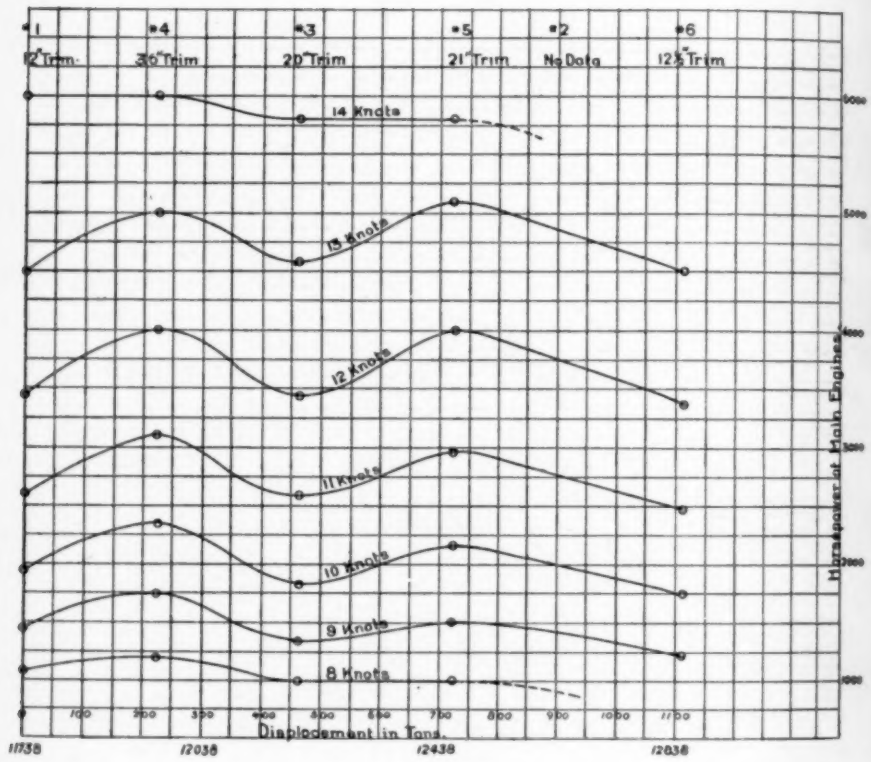


PLATE III.

Plate III shows the displacement-speed-horsepower curve of the *Kearsarge*.

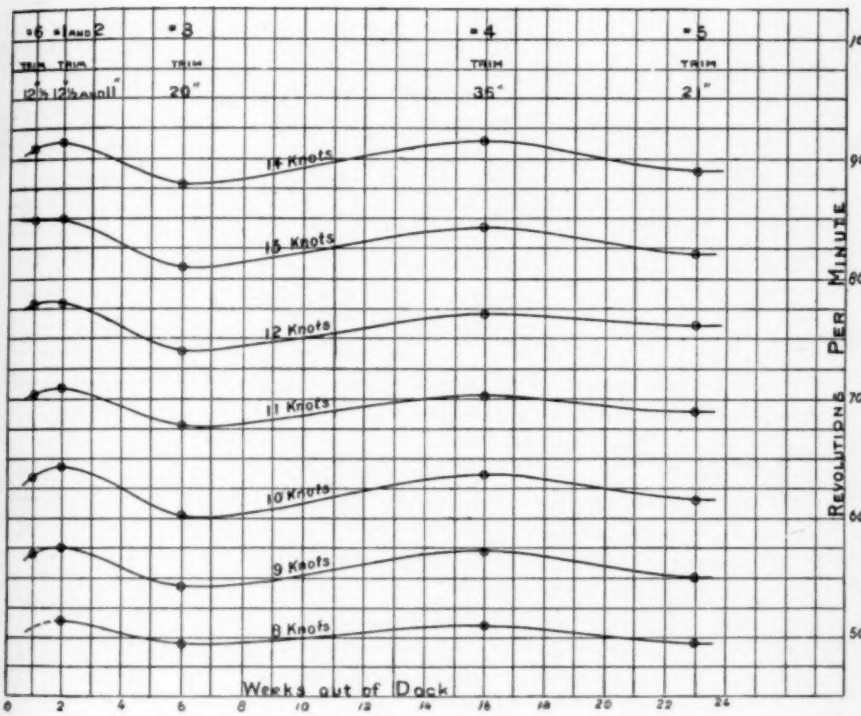


PLATE IV.

Plate IV shows the weeks-out-of-dock-speed-revolution curve of the *Kearsarge*..

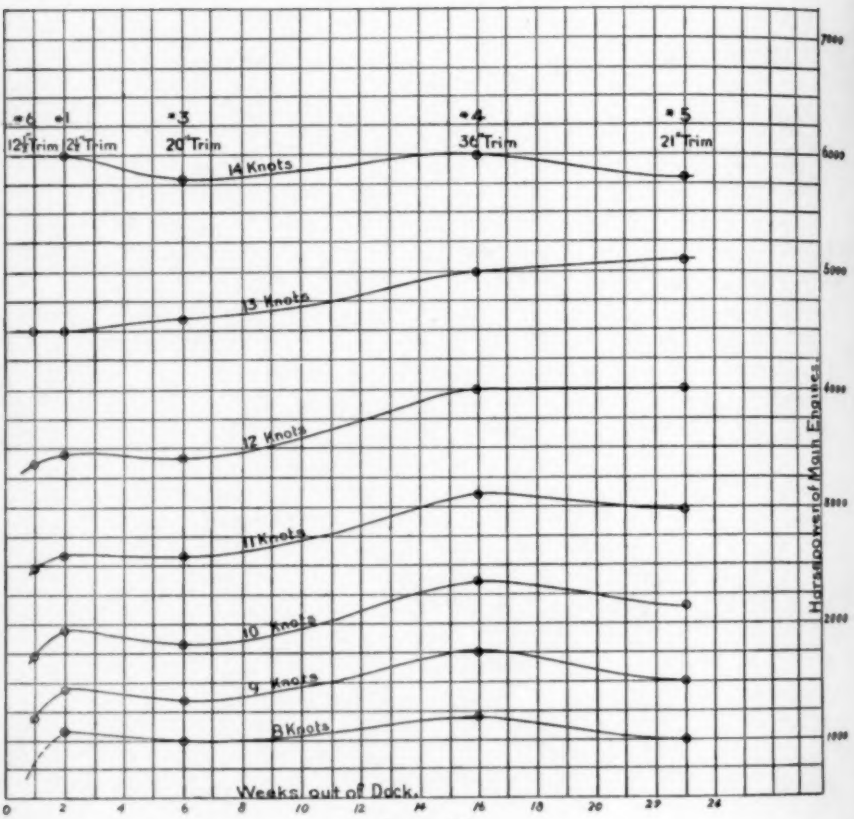


PLATE V.

Plate V shows the weeks-out-of-dock-speed-horsepower curve of the *Kearsarge*.

All four curves above seem to confirm the preceding statement (a), also those immediately following in (b) and (c). Imagine what great advantages could have been taken of this, if it had been known in time, so as to have allowed a heavier battery, more armor, more speed, or a greater cruising radius to the *Kearsarge* and to the *Kentucky!*

(b) Changes in foulness of the bottom necessitate a small increase in revolutions of the main engines and a large increase in horsepower, but in the latter case it does not seem to make so large a difference as has heretofore been generally believed.

(c) Changes in trim make great differences in the necessary revolutions and power and the coal consumption at the same actual speeds over the ground.

Below in Table III are the actual expenditures of coal of the U. S. S. *Kearsarge* at various speeds during the calendar year ending December 31, 1905.

TABLE III.

Cruising speeds.	Average revs.	Coal.
10 knots.	66	73.6 tons.
11 "	71	80.5 "
12 "	78	94.1 "
13 "	85	109.0 "
14 "	93	128.3 "
15 "	100	220.0 "
16 "	108	283.0 "
17 "	116	444.0 "

For auxiliary purposes in port, 20 tons per day.

From Table III the coal-speed (knot) curve on Plate VI is plotted; and also the coal-speed (revolution) curve on Plate VII.

When ships habitually cruise, at sea in squadron, at any given speed, a standard number of revolutions is required in order to maintain position. The major part of coal on the larger men-of-war is carried forward the midships section, and as coal is used for steaming, the trim changes, thus necessitating a changing of revolutions, which is usually to a decreased standard revolutions. Below in Plate VIII is a set of revolution-trim-speed curves of the *Kearsarge* obtained from three trims:

1st. 12 inches by the stern.

2d. 20 inches by the stern.

3d. 36 inches by the stern.

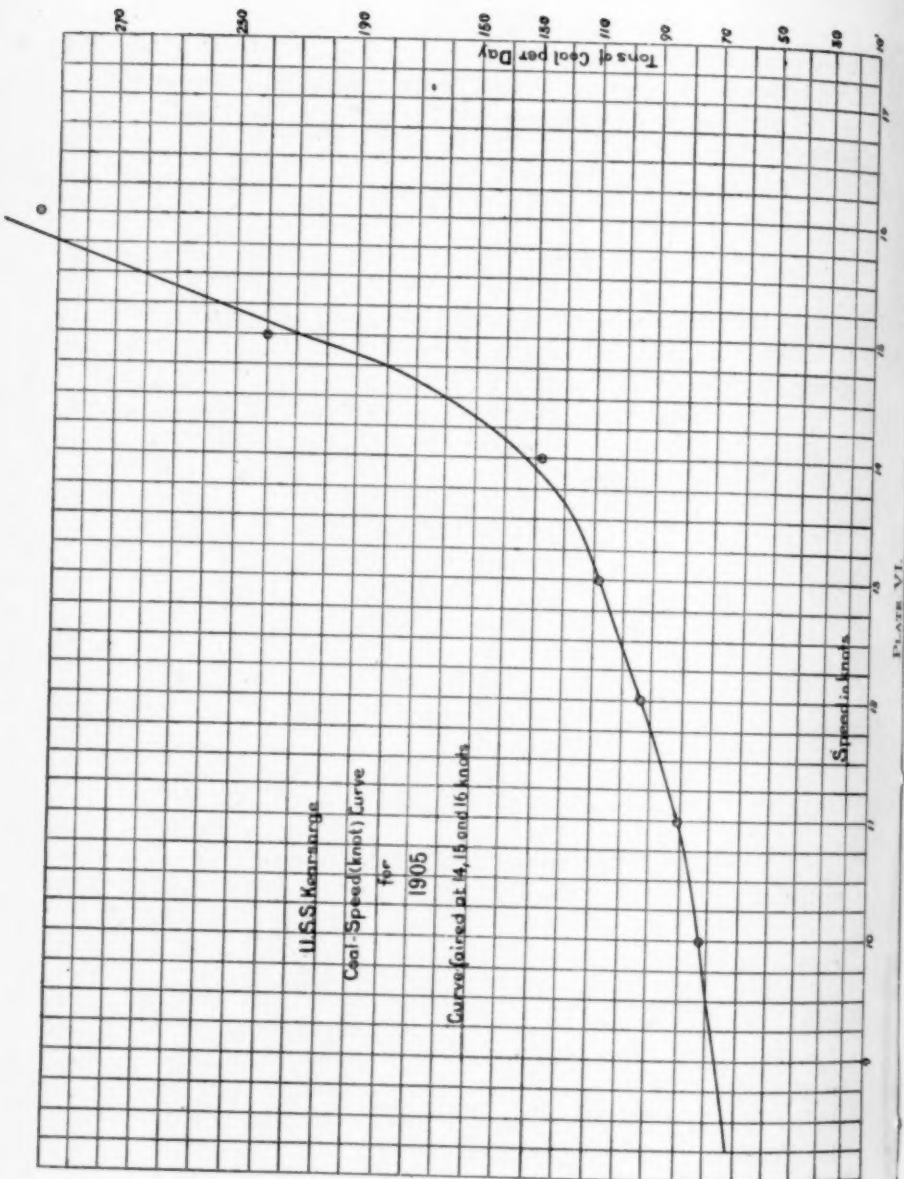

Tons of Coal per Day
270
250
190
150
130
110
90
70
50
30
10
Speed in knots
8
9
10
11
12
13
14
15
16
17
U.S.S. Kearsarge
Coal-Speed(knots) Curve
for
1905
Curve faired at 14, 15 and 16 knots

PLATE VI.

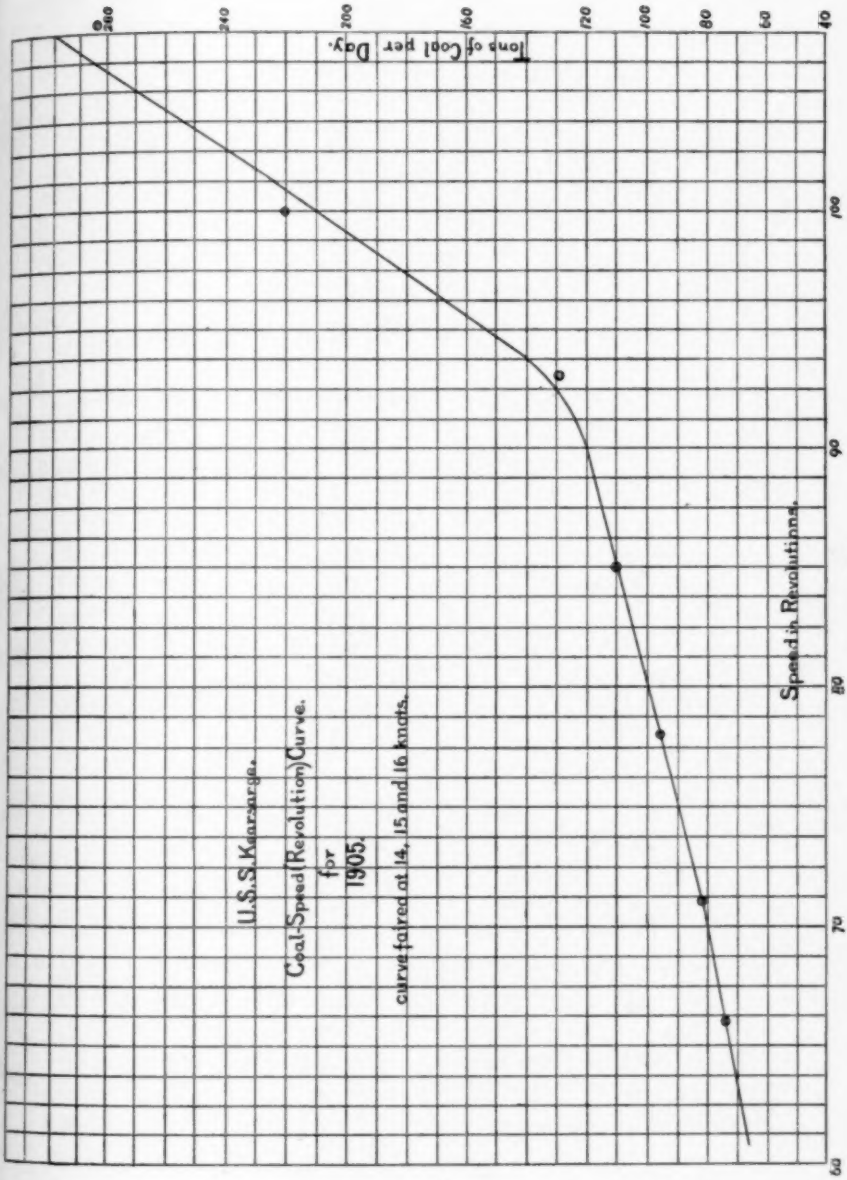

Tons of Coal per Day.
Speed in Revolutions.
U.S.S. Kearsarge.
Coal-Speed (Revolution) Curve.
for
1905.
curve faired at 14, 15 and 16 knots.

PLATE VII.

(d) When the *Kearsarge* is at her "Economical Trim"—between 20 and 28 inches by the stern—the following facts obtained from Plate VIII should be noted.

1st. Fewer revolutions are required to maintain the same speed;

2d. Consequently less horsepower is needed;

3d. And therefore from 5 to 6 per cent less coal is burned than when trimmed 12 inches by the stern.

Below in Table IV the statement in the 3d sub-paragraph immediately preceding is shown in tabular form:

TABLE IV.

Speed knots.	1		2			3			4		
	Trim 12″.		Trim 20″.			Trim 28″.			Trim 36″.		
	Revs.	Coal.	Revs.	Coal.	Gain.	Revs.	Coal.	Gain.	Revs.	Coal.	Gain.
8	51.8	....	49.5	....	....	49.9	....	....	51.0	....	....
9	57.5	....	54.6	....	....	54.8	....	....	57.2	....	....
10	64.0	70.0	60.9	64.0	6.0	61.0	66.0	4.0	63.9	69.8	.2
11	71.0	80.5	68.2	78.0	1.5	68.1	77.9	2.6	70.3	80.2	.3
12	78.0	94.1	75.2	89.2	4.9	75.1	89.1	5.0	77.0	93.0	1.1
13	85.0	109.0	82.0	103.0	6.0	81.6	102.0	7.0	84.5	108.4	.6
14	91.0	124.0	88.5	115.0	9.0	88.7	117.5	6.5	91.6	126.0	....

The gain, or saving of coal, to be made in the steaming of the *Kearsarge*, by considering the neglected factor of trim is certainly a strong argument to continue to its legitimate conclusion, this investigation and the procurement of data at all speeds for all the probable trims that might arise during service.

Tables and curves similar to all these of the *Kearsarge* here shown could probably be made for all other ships of the American Navy; and all our ships should proceed at once to obtain the necessary data.

Plate IX taken from the data of the standardization trials of the *Louisiana* class of battleships shows that enormous increase of horsepower is necessary when the ships of this class are trimmed not enough by the stern, though they have very nearly the same displacements and all make the same speed—18 knots.

There is apparently a relation between the horsepower for the *Minnesota* down by the stern and the horsepower of the *Kansas*

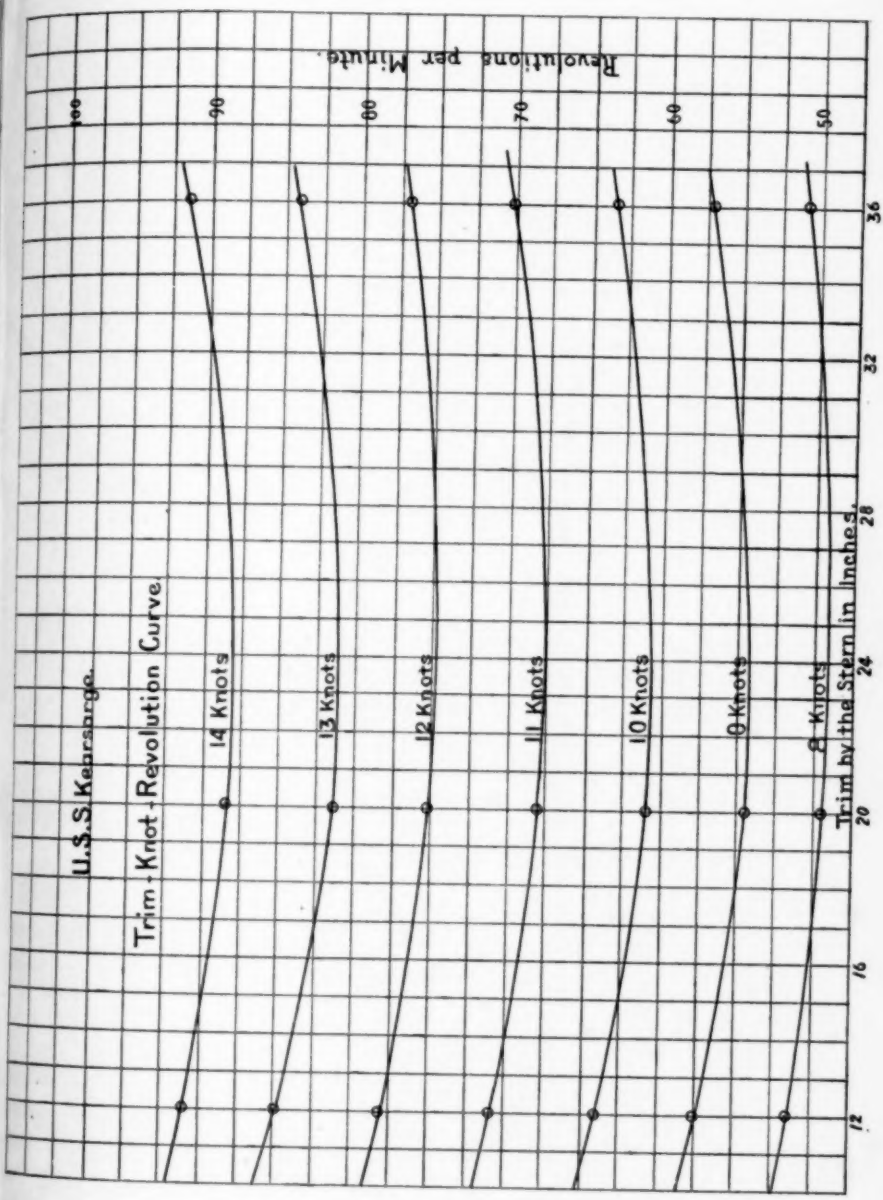
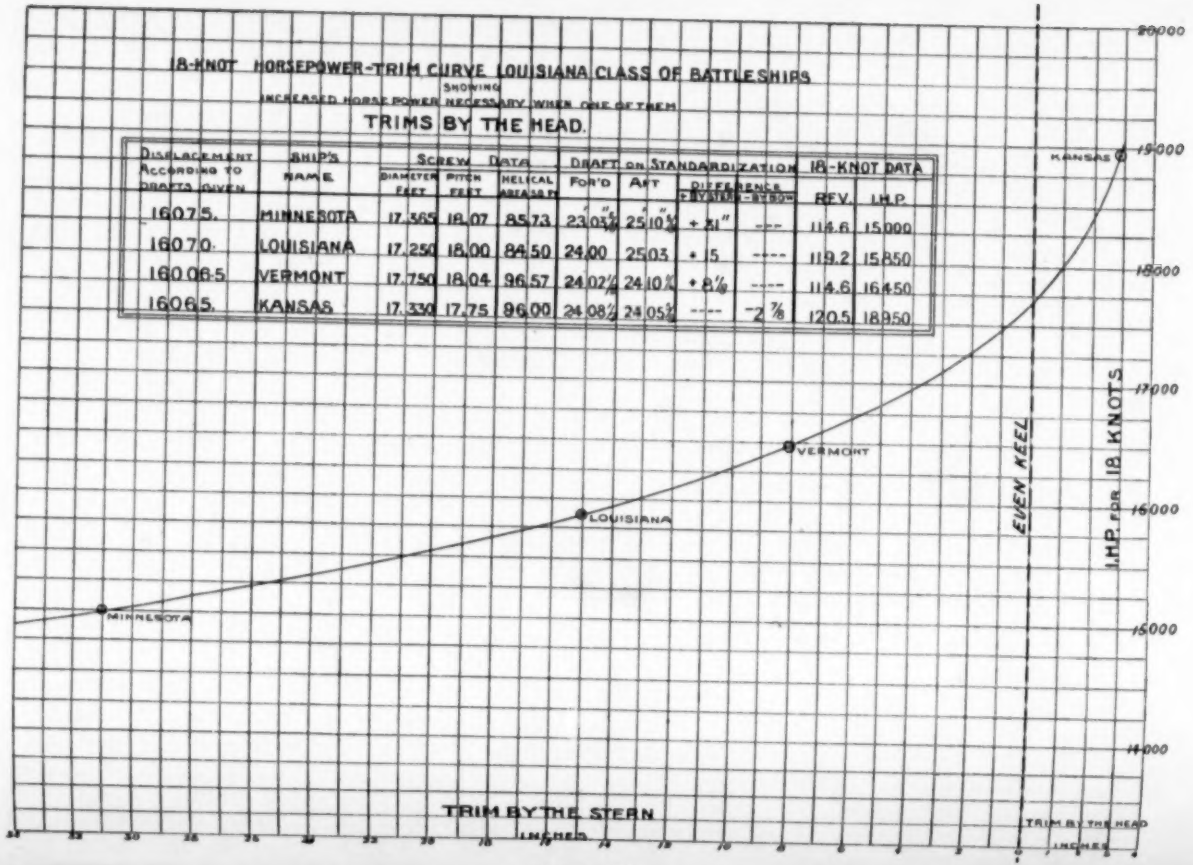

U.S.S. Kearsarge.
Trim + Knot + Revolution Curve.
Revolutions per Minute.
100
90
80
70
60
50
14 Knots
13 Knots
12 Knots
11 Knots
10 Knots
9 Knots
8 Knots
12
16
20
24
28
32
36
Trim by the Stern in Inches.

PLATE VIII.



DISPLACEMENT ACCORDING TO DRAFTS GIVEN	SHIP'S NAME	SCREW DATA			DRAFT ON STANDARDIZATION		DIFFERENCE		18-KNOT DATA	
		DIAMETER FEET	PITCH FEET	HELICAL AREA IN SQ. FT.	FOR'D	ART	+ SYSTEM	- SYSTEM	REV.	I.H.P.
16075.	MINNESOTA	17.365	18.07	85.73	23 03½/32	25 10½/32	+ 21"	---	114.6	15.000
16070.	LOUISIANA	17.250	18.00	84.50	24.00	25.03	+ 15	----	119.2	15.850
16066.5	VERMONT	17.750	18.04	96.57	24 02½/32	24 10½/32	+ 8½/32	----	114.6	16.450
16065.	KANSAS	17.330	17.75	96.00	24 08½/32	24 05½/32	----	-2 7/8	120.5	18.950

PLATE IX.

down by the head. On the *Kansas* 4950 horsepower were apparently wasted. Certainly it seems as though this power must have been uselessly expended: but was it, when we take into consideration the neglected factor of trim?

The theory of the writer is, that that amount of excess power developed by the *Kansas* was used up in changing her trim and therefore her under-water body shape to that assumed by the *Minnesota* when the latter was making 18 knots. Lacking a better name, let us call such excess power "Wasted Horsepower" and assume the following formula for the work that is done.

$$\text{Wasted horsepower} = \frac{T \times D\ 2{,}240}{33{,}000}$$

where T is the change of trim in feet, and D is the displacement in tons.

Then we have an expression for the work that must constantly be done to keep the *Kansas* trimmed so that she may make the required contract speed—that made by the *Minnesota*.

This formula may possibly be found to be, by the experiments proposed on pages 14 to 17, a general law in the application of power to ships in order to make the higher speeds.

Using the above formula and by it reducing the *Minnesota*, the *Louisiana* and the *Vermont* to a trim by the head of 2⅞ inches—and that of the *Kansas*—they would require respectively 3060, 1730 and 1000 more horsepower to make 18 knots than was developed on the trims they had on their contract standardization trials.

This is shown in Table V:

TABLE V.

Vessel.	Trim on trial.	Horse-power on trial.	Change of trim necessary to equal Kansas.	New trim.	Additional horsepower necessary at Kansas trim.	Total horsepower necessary at Kansas trim.
Minnesota.....	+ 31	15,000	− 33⅛	− 2⅞	3060	18,060
Louisiana	+ 15	15,850	− 17⅛	− 2⅞	1730	17,580
Vermont	+ 8¼	16,450	− 11	− 2⅞	1000	17,450
Kansas	− 2⅞	18,950	0	− 2⅞	....	18,960

The propellers of the *Kansas* have been changed since the above data were taken and less power is now needed in order to make 18 knots: the horsepower necessary to make this speed more nearly approaches a mean of her sisters.

PLATE IX. TRIM BY THE STERN

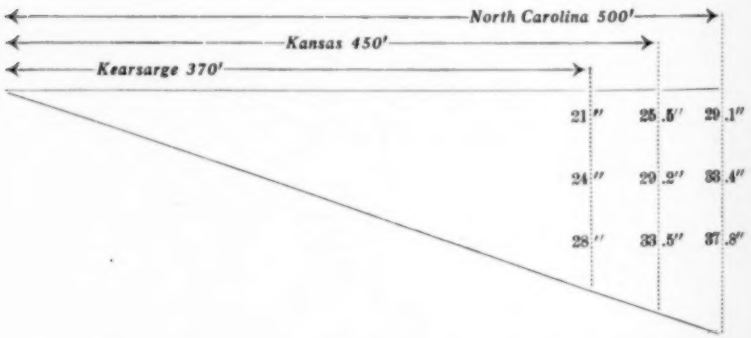
The results of the last column do not conform exactly to the formula assumed for "Wasted Horsepower," but many different errors, personal, sea, wind, etc., may enter into these sets of observations taken at different times, under different conditions of weather and sea and by different sets of observers. There may also be other factors as yet unknown which require the use of some of this "wasted horsepower."

Although the *Minnesota* gave better results than any of her sister ships when she was 31 inches by the stern, is that her proper trim? The curve shows that she could have made 18 knots on less horsepower if she had been trimmed more by the stern.

If the "Economical Trim" of the *Minnesota* is 31 inches, she being roughly 450 feet long; and if the most "Economical Trim" of the *Kearsarge* is between 20 inches and 28 inches, the latter being roughly 370 feet long; what is the most "Economical Trim" of the *North Carolina* class, they being roughly 500 feet long?

Why is there no second general law that tells us the "Best Angle of the Keel with the Surface of the Water" in order that we may at once determine the "Economical Trim" of the *North Carolina* class?

The underwater bodies of all three classes of ships may possibly be considered similar; then the illustration below might obey this as yet unknown general law of the "Angle of Trim," which surely must exist. If it does cover the case, then approximately the most "Economical Trim" of the *North Carolina* class would be 34.7 inches by the stern if 31 inches is the best trim of the *Minnesota*.



Evidently to change the trim of the *North Carolina* class from 17 inches by the head which is what they were when commissioned

and full of stores, coal, water and ammunition, to 36 inches by the stern will necessitate 53 inches × 1600 (approximate moment to change trim 1 inch), or 84,000 foot tons. Could not this have been taken into account and allowed for when the designs of this class of ships were first made?

Consider the "Wasted Horsepower" of the *North Carolina* and of the *Montana* the first year of their commission when they cruised about 30,000 miles and burned 20,000 tons of coal! Think of the "Wasted Horsepower" of the *Louisiana, Vermont,* and *Kansas* in the past! and then again in the future, unless this subject is investigated and true results ascertained! Think of the worse than wasted coal and the useless hard work of the human beings who made steam for the "Wasted Horsepower" of any and all ships of the merchant marine and of all navies, past, present and future when under way and not at their most economical trims! Think of the useless wear and tear on the boilers and on the machinery when developing this "Wasted Horsepower!"

What is the effect of varying the angle of the bilge keels to the stream lines? Ought not there to be calculated tables supplied which will show the increase of head resistance and its cost in "wasted horsepower" when the trim is wrong?

We hear much about the necessary horsepower required in order to make a certain speed, while the essential element of trim is apparently neglected.

All merchantmen know in a general way and from intimate every-day experience that a ship steams faster under the same daily coal consumption when trimmed down by the stern. But where is the exact data that is to inform them what the most "Economical Trim" is? What have they to guide them in their endeavors except a thumb rule to stow the cargo so as to make the stern as deep as possible?

And are not men-of-war in the same relative condition of ignorance and neglect?

Plates X and XI clearly show the tendency on the part of smaller craft to squat and for the bow to come out of the water when making a high rate of speed. Probably if large ships made the same speed the forward portion of their keels would be proportionately as much out of the water.

When the larger ships are traveling at the higher speeds we know that they draw less water forward and probably more aft than if floating at rest.

Some lucid explanation should be sought of the causes of the constantly increasing ratio of horsepower to speed as the speed increases above the "Economical Speed." On every ship the following should be ascertained and kept on file for constant use:

1st. The "Economical Speed."

2d. The power used at the various speeds for propulsive effect alone.

3d. The amount of power used at each speed for changing the trim—"Wasted Horsepower."

4th. The amount of power used in securing the proper "lifting effect" necessary before each higher speed can be made.

5th. The skin resistance clean, and in different stages of foulness.

6th. Head resistance with bilge keels having a head resistance of zero or at its minimum. Also the head resistance of the bilge keels at all the various improper trims possible.

At the present time there are in our navy several classes of ships, and in most cases sister ships have similar under-water bodies. Why not have ships of the same class having the same or similar under-water bodies standardize at the same time? The average result would be accurate because of the elimination of personal and other errors.

Therefore, it is suggested that battleships and armored cruisers standardize their propellers as follows:

1st. Either singly,

2d. Or else in squadrons;

in case it is determined that the wake of a ship 400 or 500 yards in advance has no effect on the ship or ships following.

A (for trim): At speeds of 8, 10, 12, 13, 14, 15, 16, etc., up to maximum speed at increments of one knot, and that indicator cards be taken during each run.

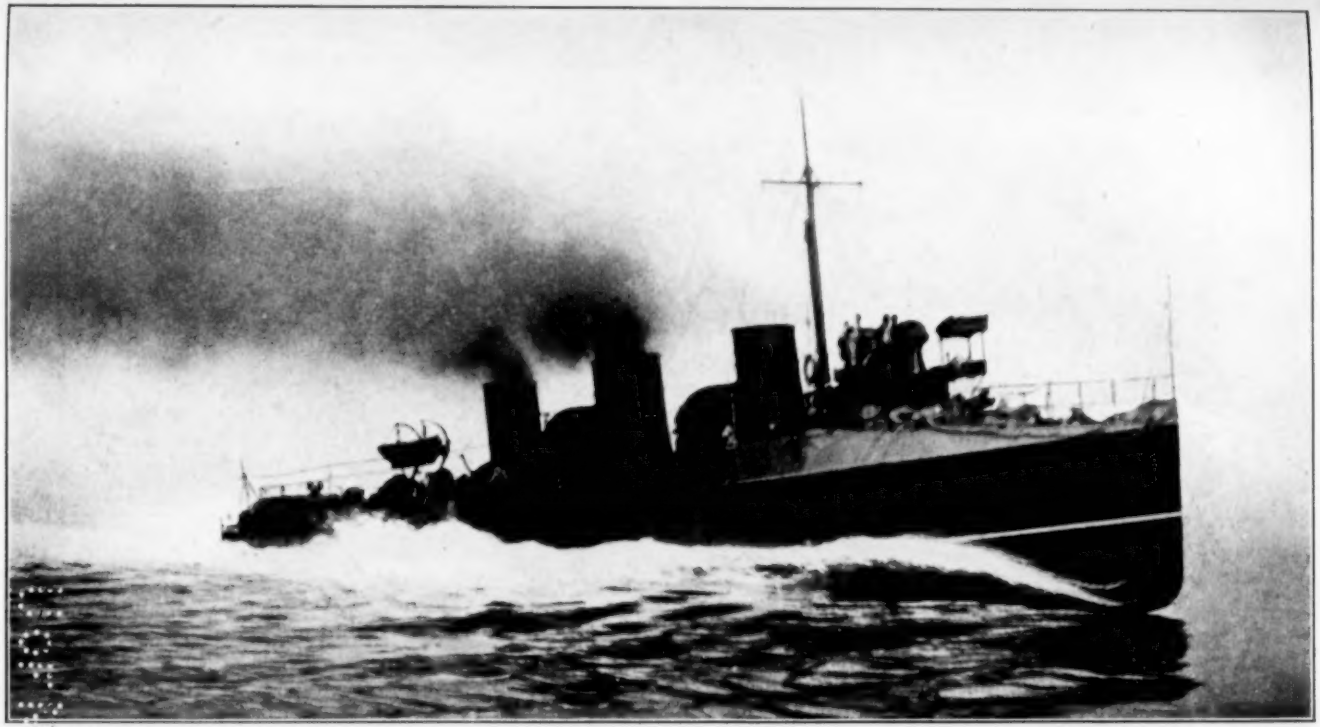
1. 12 inches by the head.
2. 6 inches by the head.
3. On an even keel.
4. 6 inches by the stern.
5. 12 inches by the stern.
6. 18 inches by the stern.
7. 24 inches by the stern.
8. 30 inches by the stern.
9. 36 inches by the stern.

BY COURTESY OF THE PARSONS MARINE STEAM TURBINE CO., LTD.

"TURBINIA"

STEAMING AT 34 KNOTS. LENGTH, 100 FT. BREADTH, 9 FT. DEPTH, 7 FT.

Built and Engined by The Parsons Marine Steam Turbine Co., Ltd.



BY COURTESY OF THE PARSONS MARINE STEAM TURBINE CO., LTD.

H.M. TORPEDO BOAT DESTROYER "VIPER"

SPEED ATTAINED, 37 KNOTS. LENGTH, 210 FT. BREADTH, 21 FT. DEPTH, 12½ FT.

Ship Built by Messrs. R. & W. Hawthorn, Leslie & Co., Ltd. Turbine Machinery by The Parsons Marine Steam Turbine Co., Ltd

B (for varying pitch): Having ascertained the trim to be known as the "Economical Trim" at which each ship will make the most speed under the least revolutions with consequent least expenditure of power and smallest coal and water consumptions then standardize at that "Economical Trim."

10. With a decrease in pitch of 6 inches.
11. With a decrease in pitch of 12 inches.
12. With a decrease in pitch of 18 inches.
13. With an increase in pitch of 6 inches.
14. With an increase in pitch of 12 inches.
15. With an increase in pitch of 18 inches.

Possibly the information discovered as result of experiments numbers 10-15 inclusive, will show that there is a more "Economical Pitch" than that at which the propellers of the vessel under trial are set. If such is found to be the case, then further experiments should be made at the increased or decreased pitch, whichever is the more economical to determine the maximum efficiency to be gained with the propellers of that diameter and area.

C (Testing of varying propeller areas): Trials should be made with increments of 1 square foot in area of the surfaces of propellers and then with decrements of 1 square foot in order to arrive at the "Economical Area" of propellers. Tests would thereby be made of the prevalent theories concerning the efficiency supposed to be gained by increasing the surface of propellers.

D (Testing varying propeller diameters): Trials should be made with different diameters of propellers, varying the diameters by 6 inches each way in order to arrive at the "Economical Diameter" of propellers.

E (Finding when cavitation begins): Once the "Economical Pitch," the "Economical Area" and the "Economical Diameter" of a propeller is discovered that becomes the "Economical Propeller." Then construct a suitable tank where the propeller or its small model may be revolved sufficiently fast to set up cavitation, determining carefully with suitable instruments the power required at the various revolutions. The value of this data would be of scientific and practical value for turbine-driven ships. Besides which more would be discovered concerning this curious phenomenon of cavitation.

Experiments called for under paragraphs B, C and D immedi-

ately above will no doubt be enormously expensive; the writer hopes that more economical methods can be found which will furnish the results so essential to ship designing and ship powering.

F (Error of model): Many efforts have been made to make accurate comparisons of the steaming performances of different types of vessels and the writer believes it to be impossible of accomplishment, except by comparing the results obtained under same conditions and from the comparisons of small models of ships of the different classes. In recent years an experimental basin has been built and splendidly equipped at one of our navy yards and sea-going officers and the service at large (as well as engineers and ship-builders in civil life) hope for useful results and consequent improvements in the designs of succeeding ships.

Experiments with models are useful and instructive, but they could be made invaluable in the future designs of hulls, and in determining the horsepower necessary to drive ships economically at the predetermined speeds, if the following method is adopted:

After obtaining the data as proposed in the preceding pages, then construct for each ship, whose data are so obtained, a model, and from it obtain similar data. The difference between the performances of the ship and the performances of the model in the experimental basin would give what may be called the "Error of the Model." The "Errors of the Models" of many ships would give an average "Error of Model" which would be of vast benefit not only in naval construction and in the design of naval machinery, but would be of incalculable benefit to the shipping world at large.

Any proposed shapes of hulls within the bounds of reason could easily and quickly be compared with models of ships whose exact data had been already determined. And hull designers could cheaply and in very short time try out all their pet theories as to proper forms of under-water bodies for ships of all types, whether racing yachts or colliers—torpedo-boats or battleships.

More experience might also be obtained so that the direction of stream lines would not still be shrouded in darkness.

It seems to be the established policy of the Navy Department to have the Atlantic Fleet cruise near Provincetown during the summer and near Guantanamo during the winter, and off both these localities there are good standard mile courses, though with different depths of water. The retardation caused by shallow

water might be more than guessed at if comparisons of similar performances of many different ships were made, for at Guantanamo the water is much deeper than at Provincetown, Barren Island or Rockland.

An immense amount of time during each year is devoted to working out squadron maneuvers, to preparation for target practice, to giving liberty and for repairs. While the first two of these are being done, ships could easily obtain the data that hull and engine designers need so urgently. Even if two weeks, twice a year, were required on this most important duty, such a small amount of time should not be withheld where efficiency and economy are the returns?

Our navy is constantly growing and the time will soon come when economy of operation will be demanded by tax-payers, and this is to be obtained only by discovering the maximum possibilities, and designing ships and their machinery therefrom.

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U. S. NAVAL INSTITUTE, ANNAPOLIS, MD.

THE DEVELOPMENT OF THE NORFOLK NAVY YARD.

By CIVIL ENGINEER A. C. CUNNINGHAM, U. S. Navy.

The Norfolk Navy Yard was begun by the British before the War of the Revolution. During the war it passed into the hands of the State of Virginia and was continued as a ship yard. Finally, in 1800, it was purchased by the Federal Government from the State of Virginia for use as a Government navy yard. In its early days it was known as the Gosport Yard, from the name of the adjacent town. Gosport was absorbed by the city of Portsmouth, and the yard finally became known as the Norfolk Navy Yard to distinguish it from the Portsmouth Navy Yard in New Hampshire.

DEVELOPMENT IN AREA.

The original yard is shown on Plate 1, defined by a heavy line. The area of the original yard was about 16 acres. About 1827 additional territory was added to the yard by purchase from private parties. This territory is shown on Plate 1 and comprises about 66 acres; in connection with the original purchase, it still constitutes the working area of the yard, as will be seen by reference to Plate 3. Shortly after this addition was made to the yard, the first dry dock was commenced, it being one of the first three built by the navy, the others being located at Boston and New York.

The next addition to the yard was made about 1848 by the purchase from private parties of the St. Helena tract on the eastern side of the southern branch of the Elizabeth River. This addition is shown on Plate 2 and also on Plate 3, north of the heavy line, and comprises about 46 acres. This was followed by the purchase from private parties, about 1899, of approximately 45 acres known as the Cedar Grove property to the south of St. Helena, shown on

Plate 1.

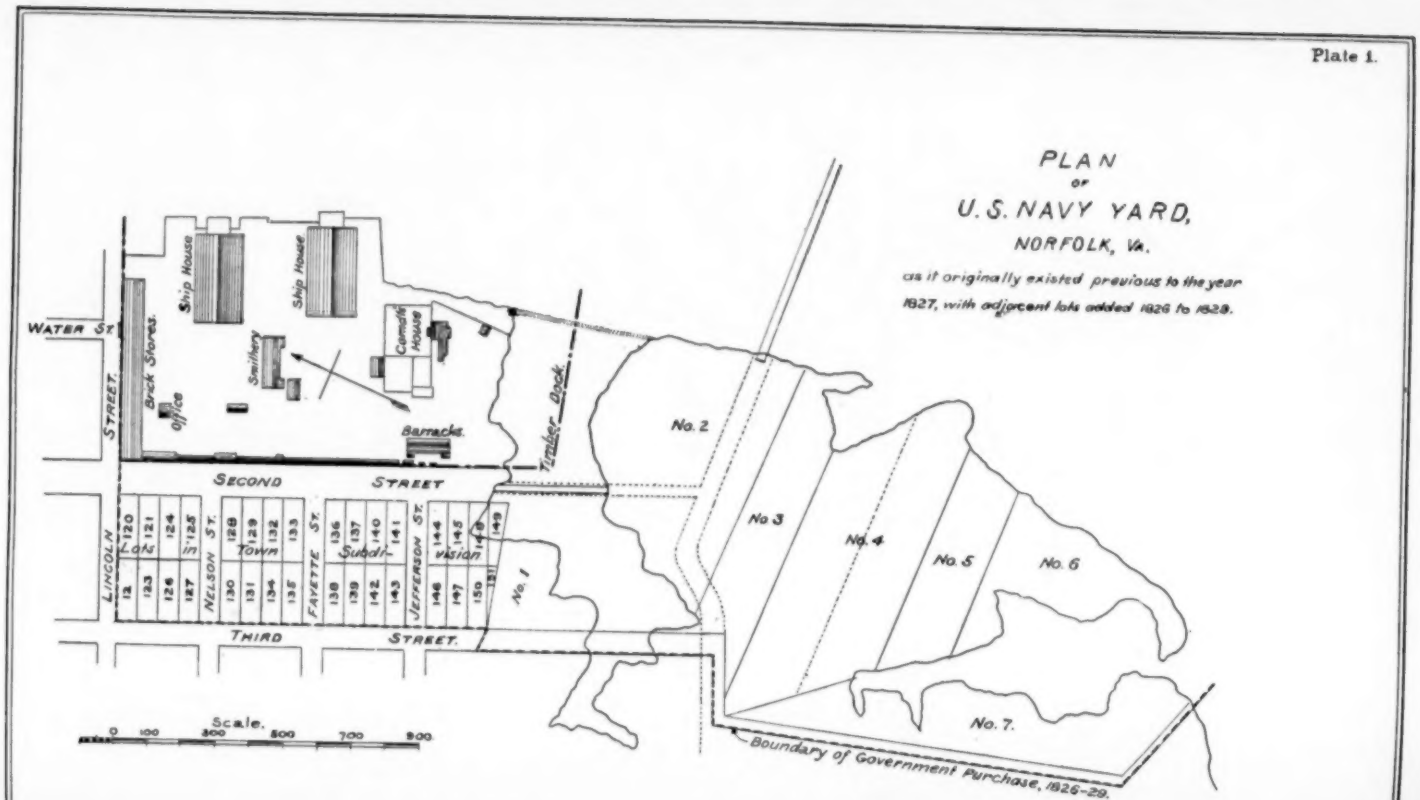

PLAN
OF
U.S. NAVY YARD,
NORFOLK, Va.
as it originally existed previous to the year 1827, with adjacent lots added 1826 to 1828.
WATER ST.
STREET.
Brick Stores.
Office
Ship House
Ship House
Smithery
Commdt. House
Barracks.
Timber Dock.
SECOND STREET
THIRD STREET.
LINCOLN
NELSON ST.
FAYETTE ST.
JEFFERSON ST.
Lots
Town
Subdivision
No. 1
No. 2
No. 3
No. 4
No. 5
No. 6
No. 7.
Scale.
0 100 300 500 700 900
Boundary of Government Purchase, 1826-29.

Plate II.

PLAN OF

SAINT HELENA

OPPOSITE

U S NAVY YARD NORFOLK, VA.

AS SUBMITTED BY

THE NAVAL BOARD ON YARDS AND DOCKS

OCTOBER, 1869.

NOS. 65 TO 70		Equipment Coal Storage
" 71 " 79		Construction Timber Storage.
" 80 " 85		Ordnance Shops and Stores.

THE NUMBERS IN THE NAVY YARD ARE ASSIGNED AS FOLLOWS:-

CONSTRUCTION:— 11, Coals. Stores; 18, Engines. Shop; 25. Timber; 26. Paint Shop; 29. Mast House; 30, Ship Joiners; 31, Shipwrights; 32, Saw-mill; 34. Plumbers, Iron Platers; 36, Smithery; 37, Timber; 44, Engines and Boilers;

STEAM ENGINEERING:— 39, Forge Shop; 41, Pattern Shop; 42, Coal Stores; 43, Erection Shop; 45, Machine Shop; 47, Foundry; 48, Brass Foundry; 49, Smithery.

YARDS AND DOCKS — 9, Engines, Firemen, 21, Stores; 27, Shop; 28, Fire Engines; 51, Storehouse; 52, Engines; 58, Gas House.

EQUIPMENT:— 7, Rigging and Sail Loft; 10, Cabin and Stores; 56 and 57, Coal.

ORDNANCE:— 19, Stores; 20, Machine Shop; 23, Timber.

MISCELLANEOUS:— 2, Marine Barracks; 4, Officers' Quarters, Offices; 5, 6, 22, 32, 35, 38, 40, 46, 50, Reservoirs; 8, Provisions and Clothing; 13, 14, 15, 59, 61, 63, Building and Launching Slips; 16, 17, 62, 64, Dry Docks, 24, Navigation and Hydrography.

SHADING shows existing structures.

PLAN OF THE

U. S. NAVY YARD, NORFOLK, VA.

AS SUBMITTED BY

THE NAVAL BOARD ON YARDS AND DOCKS

OCTOBER, 1869.

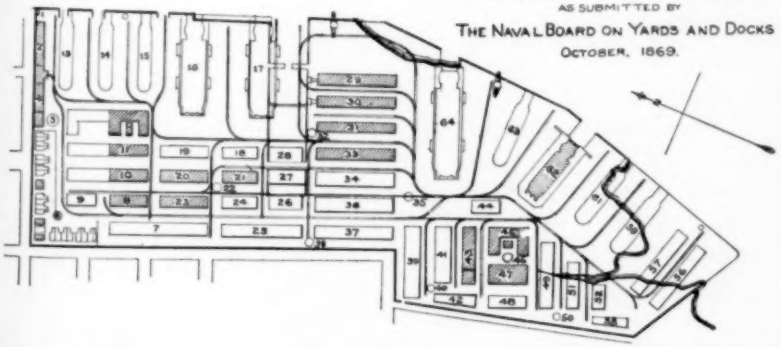


Plate 3 to the south of the heavy line. The name of Cedar Grove was not retained, but the name of St. Helena was extended over the new tract.

The last addition to the yard is known as the Schmoele tract, and is shown on Plate 3 to the south and west of the heavy line. This was purchased from private parties about 1904 and comprises about 272 acres.

EARLY DEVELOPMENT OF RESOURCES.

A comparison of Plates 1 and 2 shows the development of the yard in resources between 1800 and 1869. At the latter date it contained, principally, a small granite dry dock, a timber basin, and a few buildings, the resources of the original yard having disappeared. This comparatively small development does not indicate that the yard was inactive, but is due to the fact that the ships of that period were of wood with hemp and manila rigging, and much of the work of construction and repair did not require extensive shop facilities. During the Civil War period, 1860-1865, this yard being either in Confederate possession or territory, no improvements were undertaken by the Federal side, or were possible on the Confederate side. The political situation and the reaction from war conditions following the Civil War further retarded much development of the yard for many years.

RECOMMENDED DEVELOPMENT.

In 1869 a board was appointed to investigate the condition of navy yards and make recommendations concerning them. The scope of the board's duties is shown by the following order which was given it as a precept:

NAVY DEPARTMENT, March 11, 1869.

Sir: You are hereby appointed senior officer of a board to examine into the condition of our navy yards, after the completion of your present duty.

The following named officers have been directed to report to you at the New York Navy Yard, where you will commence your labors: Rear-Admiral Stribling and Commodore S. P. Lee.

It is desirable first to ascertain the condition and wants of our navy yards, so that they may be rendered efficient in time of war. It is also desirable to have the permanent peace establishment and the expenses of the yards reduced to the lowest scale consistent with efficiency and economy.

Not a single person should be retained in the yards whose services can be dispensed with. You will report to the Department on the preservation and care of public property at the yards.

Chief Engineer Henderson has been directed to report to you and assist the board in the examination of engines that are stowed away in the different yards, but not as a member of the board. You will state what these engines are, their capacity, and what sized vessels they were built for, also by what authority they were constructed, at what time, whether they are suitable for vessels of war, taking into consideration power, economy, and efficiency; and if not, if any portions of them can be used in constructing other engines, or if anything in the engineer department can be disposed of with advantage to the Government. You will examine closely into the present organization of the yards, and recommend if anything more simple and efficient can be devised.

It is desirable to bring every department of the yards under the immediate authority of the commandant.

You will furnish lists to include every person now employed in the yards, and a list of reductions you propose. You will report if there is any public property which it is desirable to sell. You will examine the condition of the dry docks, and state whether they are capable of repairing our naval vessels in war time; you will also make such recommendations as you may deem proper in regard to providing additional dry docks for the use of the navy. You will draw up a uniform set of regulations for the government of the different yards and transmit them to the Department.

Besides the matters above enumerated, your duties will require you to examine into everything coming under your notice, in order to bring about a better system of economy than now exists.

To enable the board to obtain full information on all subjects, the commandants of the several yards will be associated with you and will furnish you with such a number of draughtsmen and writers as you may require.

For the present your investigations will be confined to the navy yards at Portsmouth, Boston, New York, Philadelphia, Washington, and Norfolk.

You will furnish your report with the least possible delay, in succinct form, and tabulated so that it can be referred to without difficulty.

Very respectfully,

A. E. BORIE,
Secretary of the Navy.

REAR-ADMIRAL S. H. STRINGHAM,
United States Navy.

This was in the period immediately following the Civil War, and the order indicates that a thorough "house-cleaning" was contemplated, as well as an extensive preparation for the future.

With regard to the Norfolk Navy Yard the board reported, in part, as follows:

NAVY YARD, NORFOLK, VIRGINIA.

This is considered the best site on the Atlantic sea-board for a large navy yard. The judgment of Commodore Decatur occasioned its selection. It is the only navy yard on the southern sea-coast. It is situated near the capes of Chesapeake Bay on the Elizabeth River, and its nearest part is

about five miles above the locality convenient for obstructions and their defense against surprise and assault by sea. Though near the sea, it is as inaccessible to attack as if it were far inland, possessing every advantage required for defense by sea and by land, and by exterior and interior lines and works. The situation is healthy, in a temperate climate, in the sea air, and on a firm, sandy soil, abounding in pines.

The harbor is accessible at all seasons of the year, and is one of the best on the Atlantic Coast of the United States. It is free from all obstruction and damage from ice.

An extent of land and water-front, with deep water desirable for a great modern navy yard, can now be had on the improved banks of the Elizabeth River.

The Dismal Swamp will afford, at small cost, fresh water for a great extent of basins, in which scores of iron-clads may be kept without rusting, floating in fresh water (free from all impurity), or blocked up dry and ventilated, ready for sudden service, especially for the defense of our great sea-board cities, the national capital, and the State and commercial capitals of Virginia and Maryland.

The Chesapeake Bay, with its fine navigable rivers, and the railroads, made and making, connect it with the great West and with the timber, iron, and coal regions of both Virginias, Maryland, and Pennsylvania. Its central and favorable position on the coast connects it by safe and easy water communication with the live-oak, pine, and other ship timber of Florida, Georgia, and the Carolinas, and with the naval resources of the northern cities. Good mechanics are attracted here by the mild climate, cheap homes, and the steady employment which experience has shown that the necessity of the Government requires and supplies.

Here may be large and useful arsenals for the construction, repair, equipment, and safe-keeping of armed and armored vessels of wood and iron; for the fabrication and delivery of cannon and munitions of war; rope of hemp and wire, and for the storage of the great quantity of material needed for the number and kinds of vessels which war and peace now require.

We earnestly recommend the immediate purchase for naval purposes of both banks of the Elizabeth River, from the navy yard to the locks of the Dismal Swamp Canal for the breadth of one mile from the middle of the river. This important site, worthy of defense, and on good lines by sea and land, may now be got for the low price of farm land in that region.

Its Favorable Qualities for a Great National Navy Yard.—Its natural features, proximity to the sea, central position on the coast, mild climate, secure defense by sea and land, large accessible harbor, safe from wind, sea, and ice; grand extent of fit and inexpensive land, supplying the most abundant and convenient water-front, and almost natural basins like Paradise Creek, are extremely favorable for the construction of a great and national navy yard for all the purposes which modern naval warfare requires. The Government has declared the importance of this navy yard by the large fortifications erected at Fortress Monroe and the Rip-Raps. Earthworks and obstructions at Craney Island will supply a strong interior defense against naval approach.

List of improvements and numbers for the United States navy yard at Norfolk, Virginia, as sketched on the accompanying plan:

Quay walls, where there are none now, or where they have not sufficient strength and depth, to be built on the water-front. Erect two derricks of the best kind and largest capacity; also, five cranes of ample capacity to meet the wants of the yard. Additional quarters for officers to be built near the present quarters. To make the United States property at St. Helena, opposite the Norfolk Navy Yard, useful for naval purposes, and supply a part of the want of area at that navy yard, it is proposed to extend the limits at St. Helena, as shown on the plan. This would require the purchase of about thirty (30) acres of adjoining land, which, it is believed, may be got at the moderate rate of farming land there. This extension will, in connection with the property owned by the Government there, afford a water-front of about 1500 feet, and allow a ship channel of 1200 feet wide between the navy yard and St. Helena. The part of the St. Helena property and proposed purchase extending beyond the proposed water-front of St. Helena should be deepened to the depth of the channel, and the material may be conveniently used for filling up the low land at St. Helena, and in the navy yard. Front the St. Helena and proposed extension, when purchased, with a substantial quay wall, of proper depth for the largest vessels, and surround it with a good boundary wall. A steam derrick, of capacity to lift the heaviest ordnance, and two cranes, of ample capacity, to be erected on the water-front.

The improvements and resources recommended for the existing yard by the board are shown on Plate 2. A comparison of Plates 2 and 3 will show that the board's most important and leading recommendations were never followed. It was unusually well qualified to advise in these matters on account of the Civil War experience, and its recommendations undoubtedly carried great weight at the time. Had the board's recommendations been at once carried out, it is apparent that it would have been a misfortune at the present time, no matter how appropriate they may have seemed when made. The water-front of the yard would have been filled with dry docks and building slips that long before the present time would have been practically useless and obstructions, and the navy would have acquired a large territory of no use to it which would have been an impediment to private and commercial development. The proposed development of resources at St. Helena was an error that might have been seen at the time; it divided the yard into two parts separated by a considerable body of water, the inconvenience of crossing which would have been prohibitive of any efficient operations.

The recommendations of this board are as striking an example

as can be found of how impossible it is to accurately predict and provide for the future of a navy yard in great detail.

LATER DEVELOPMENT.

The actual development in resources of the Norfolk Navy Yard from 1869 to the present time is shown on Plate 3. It is a mixture of old and new buildings, and has been a matter of expediency and available resource, without following any definite or gradually maturing plan. Each bureau of the Navy Department has sought to secure all the funds that it could from Congress for its own particular needs, and to occupy the most favorable locations it could secure in the yard without regard to the needs of other bureaus.

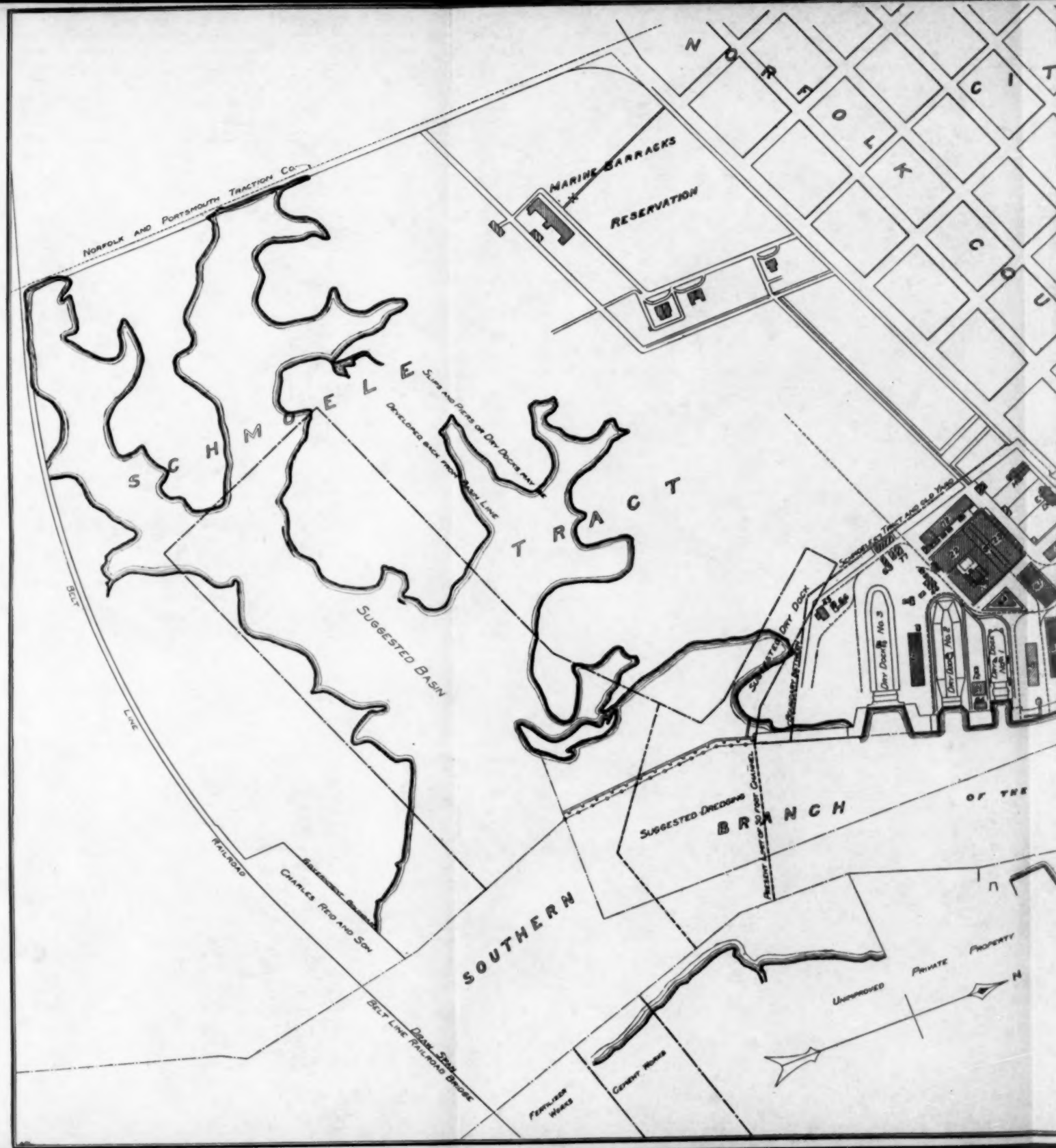
CONCERNING APPROPRIATIONS.

A favorite method of obtaining appropriations for a navy yard from Congress has been to submit an annual estimate for millions of dollars in the hope of obtaining a few hundred thousand. These estimates are first pared down by the bureaus concerned, then by the Navy Department, and finally by Congress, and it may well happen that estimates first used for "padding" and not urgently needed may sometimes be appropriated for to the exclusion of more needed improvements. In this game it is well known that small items are more easily obtained than large ones, and a very necessary improvement may sometimes be secured in detail that could not be had in a lump.

A reform in the manner of securing annual appropriations for navy yards is needed. At present the annual estimates originate with the officers attached to the yard at the time. These officers are frequently changed, their ideas vary considerably, and as a rule their interests favor the bureau they naturally represent. Each bureau favors its own interests, and the Department itself has not the experience or information to always make a correct discrimination. When the matter finally reaches Congress the total amount that can be appropriated for that year is the governing factor.

NAVY YARD DEVELOPMENT BOARD.

The needs of a navy yard can be foreseen for five, and probably ten, years at least, as existing ships must be taken care of during that period. With this in view, the development of a yard should


NORFOLK CITY
NORFOLK AND PORTSMOUTH TRACTION CO.
MARINE BARRACKS
RESERVATION
SCHMELE TRACT
SUGGESTED BASIN
SLIPS AND PIERS OF DRY DOCKS RAILROAD
DEVELOPED BACK FROM BULK LINE
SUGGESTED DRY DOCK
DRY DOCK No. 3
DRY DOCK No. 2
DRY DOCK No. 1
SUGGESTED DREDGING
BRANCH
OF THE
SOUTHERN
RAILROAD
BELT LINE
CHARLES REID AND SON
BELT LINE RAILROAD BRIDGE
FERTILIZER WORKS
CEMENT WORKS
UNIMPROVED
PRIVATE
PROPERTY

NORFOLK CITY
MARINE BARRACKS
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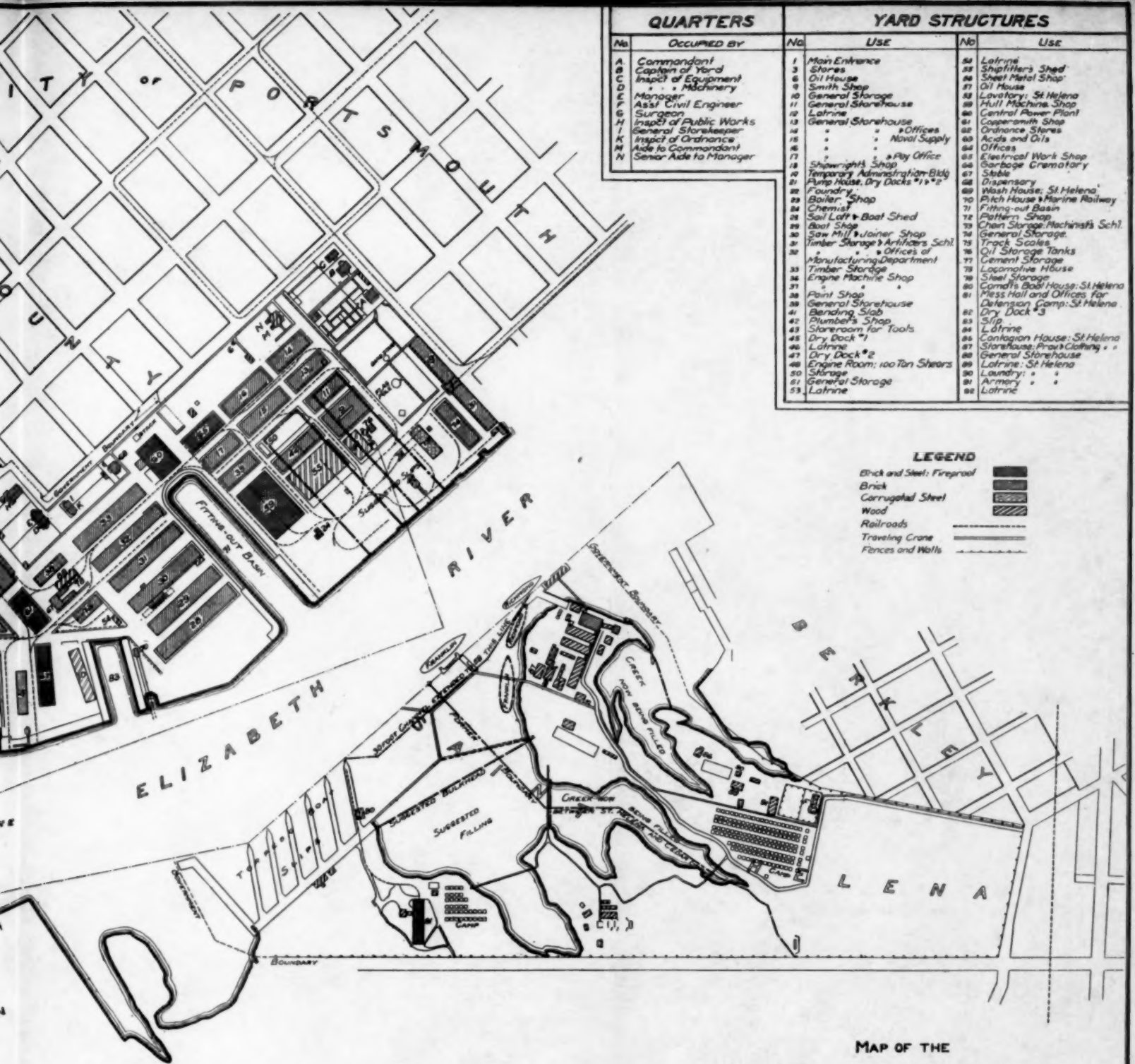

QUARTERS

No.	Occupied By
A	Commandant
B	Captain of Yard
C	Inspct of Equipment
D	" " Machinery
E	Manager
F	Asst Civil Engineer
G	Surgeon
H	Inspct of Public Works
I	General Storekeeper
K	Inspct of Ordnance
M	Aide to Commandant
N	Senior Aide to Manager

YARD STRUCTURES

No.	Use
1	Main Entrance
3	Stores
6	Oil House
9	Smith Shop
10	General Storage
11	General Storehouse
12	Latrine
13	General Storehouse
14	" " ▸Offices
15	" " Naval Supply
16	" "
17	" " ▸Pay Office
18	Shipwright's Shop
19	Temporary Administration Bldg
21	Pump House, Dry Docks #1 & #2
22	Foundry
23	Boiler Shop
24	Chemist
25	Sail Loft ▸Boat Shed
29	Boat Shop
30	Saw Mill ▸Joiner Shop
31	Timber Storage ▸Artificers' Schl
32	" " ▸Offices of
	Manufacturing Department
33	Timber Storage
34	Engine Machine Shop
37	" " "
38	Paint Shop
39	General Storehouse
41	Bending Slab
42	Plumber's Shop
43	Storeroom for Tools
45	Dry Dock #1
46	Latrine
47	Dry Dock #2
48	Engine Room; 100 Ton Shears
50	Storage
51	General Storage
53	Latrine
54	Latrine
55	Shipfitter's Shed
56	Sheet Metal Shop
57	Oil House
58	Lavatory: St Helena
59	Hull Machine Shop
60	Central Power Plant
61	Coppersmith Shop
62	Ordnance Stores
63	Acids and Oils
64	Offices
65	Electrical Work Shop
66	Garbage Crematory
67	Stable
68	Dispensary
69	Wash House; St Helena
70	Pitch House ▸Marine Railway
71	Fitting-out Basin
72	Pattern Shop
73	Chain Storage; Machinist's Schl
74	General Storage
75	Track Scales
76	Oil Storage Tanks
77	Cement Storage
78	Locomotive House
79	Steel Storage
80	Comdt's Boat House; St Helena
81	Mess Hall and Offices for
	Detention Camp; St Helena
82	Dry Dock #3
83	Slip
84	Latrine
86	Contagion House; St Helena
87	Storehouse; Prov ▸Clothing " "
88	General Storehouse
89	Latrine; St Helena
90	Laundry: " "
91	Armory " "
92	Latrine

LEGEND

- Brick and Steel: Fireproof
- Brick
- Corrugated Steel
- Wood
- Railroads
- Traveling Crane
- Fences and Walls

MAP OF THE UNITED STATES NAVY YARD NORFOLK, VA.

SCALE OF FEET

be determined upon by a suitable board, and estimates made accordingly. The work should be largely done at the yard itself and the board should give the officers at the yard every opportunity to advance their ideas and claims for its benefit and consideration. A definite basis can then be established for annual appropriations, and whether much or little can be secured in any one year, it can be distributed and applied to a logical and progressive development. Such a board would also be able to recommend a proper balance of appropriations between different yards. No officer newly attached to a navy yard can make a wise or discriminating estimate of its needs from his own immediate knowledge, and it does not follow that all can do so even after some experience and familiarity. This navy yard development board should be a permanent one and its personnel should change with discretion, and should further represent all interests of the service. It is evident that no legislation is necessary to create such a board, and it would remedy the present illogical and ill-defined conditions. The proper start for such a board would be to take the present annual estimates that are submitted from the yards, and from a personal inspection, and with consultations with the bureaus and officers concerned, reduce them to some permanence and order for the use of the Department.

FUTURE DEVELOPMENT.

The future development of the Norfolk Navy Yard starts from the plan shown on Plate 3, and has already had some study and consideration since the acquirement of the Schmoele tract.

CHANNEL.

The first matter that attracts attention is the narrowness of the channel in front of the yard, it being only about 600 feet wide and uncomfortably narrow for turning the present ships of the navy. This is already being partially remedied by the removal of the receiving ships *Franklin* and *Richmond* into a dredged pocket, and by increasing the channel width by dredging in the St. Helena tract, all as indicated on Plate 3. As the torpedo-boat slips on the St. Helena side are of wood, and the improvements on the peninsula are of a cheap and temporary nature, it is evident that the development of the necessary width of channel on the St. Helena water-front in the future is entirely in the Government's control.

The important matter for future conditions is that no permanent improvement shall be made at St. Helena that will restrict the desirable widening of the channel. An incidental improvement at St. Helena which accompanies the present widening of the channel is the filling of the creeks indicated with the spoils of dredging. With future dredging operations the remaining creek and part of the inlet may be filled and reclaimed as indicated, thus securing valuable land area.

From the end of the St. Helena tract to the southern end of the yard the Government has no control of the eastern bank of the river. About 900 feet of the eastern bank north of the Belt Line Railroad is already being developed for commercial purposes and its acquirement by the Government would now be a matter of considerable expense; this, however, does not seriously affect the yard channel, if the Schmoele tract is developed with a basin. Between these commercial developments and the St. Helena tract it is probably still possible for the Government to obtain possession of the eastern bank of the river for the protection and widening of the channel at a reasonable cost, as no important improvements have yet been made. Any marked delay, however, will probably result in increased cost, as commercial developments are likely to begin soon. This water-front cannot be obtained alone, but some territory in the rear will accompany it which will be of no great value to the yard proper, but which can be utilized by the navy in various ways. The restriction of the channel by not acquiring this water-front is not the only thing to be considered, as commercial development means increased shipping traffic in front of the yard, which will also prove an inconvenience in the movement of naval vessels and in the use of the dry docks. The failure to acquire this unimproved water-front will not be fatal to the future usefulness of the yard, if, as previously stated, the Schmoele tract is developed with a basin.

PURCHASE OF LAND.

In this connection, it may be said that land in many cases is not purchased by the Government, but is sold to it. The distinction is as follows: It may become recognized by officers that certain territory is very desirable for the Government and its acquirement recommended. Lapses of interest and changing administrations may prevent continued and sustained action, and nothing be ac-

complished beyond a growing recognition of the need. Local civilian interest and enterprise may then take the matter in hand and by concerted and sustained action secure an appropriation for the purchase of the desirable tract which the recommendation of officers alone would never accomplish. It is fortunate that this can be done, and as it cannot be accomplished without the approval of officers in a position of trust, it is not likely that property will ever be forced on the Government that will not be immediately or ultimately valuable.

SCHMOELE TRACT.

After consideration of the channel, the question may well arise, what will be done with the Schmoele tract? Every board or individual that has considered the matter has recognized that it should be developed with a basin to bring out its full value and incidentally increase the water-front of the yard. The natural mistake has been made of going into too much detail and making a scheme that largely ignored existing conditions and amounted to perhaps a twenty-million-dollar improvement to be accomplished as soon as possible. It has been repeatedly demonstrated that there is no better way to discourage Congress than by going to it with a minutely developed twenty-million-dollar scheme. Whatever general merit such a scheme may have is very likely to be masked by its proposed cost. The demonstration in a comparatively short time that some of these schemes have not possessed enduring merit has further rendered Congress shy of them. A backward look at the recommendations of the board of 1869 should be a further warning against the development of too much remotely future detail as a fixed condition.

BASIN.

The desirability of water-front for a navy yard, and that as conveniently located as possible, will carry a basin for the Schmoele tract through any test that can be applied. This basin may be of quick or slow development, but its importance is apparent. A basin is indicated on Plate 3. This is not the basin that others have proposed, nor is it considered that it is the only basin that can be made. Whatever basin is decided on, however, should properly balance with the land area, permit of piers and slips, and have the working area mostly on one side. The other

side of the basin should permit some development, and also provide for widening in the unknown future. The beginning of the basin and its progressive development should be of value as well as its completion. One of the serious needs of the Norfolk Yard is a place for mooring vessels in ordinary out of the river channel. Whatever reasonable portion of the proposed basin is excavated at any time can be utilized with inexpensive wooden constructions for mooring that need not interfere with the continued extension of the basin to completion or with its final use.

PROPOSED DRY DOCK.

An immediately important improvement that is needed at the yard is an additional dry dock of the first class. The yard has only one dry dock (No. 3) that will take the present ships of the navy, and the 20,000-ton battleships will not be gotten into it with convenience. It is generally considered that the new dock should be located somewhere in the general position shown on Plate 3. This position gives excellent direction for vessels entering and leaving the dock, and is as convenient as may be to the present working part of the yard. As the Schmoele tract develops, the dock will become more and more central, and all the docks will be kept in the same general group, which is a desirable consideration. The channel of the river has been recently dredged to a depth of 30 feet at mean low water to the dotted line shown at the entrance of this proposed dock. It will then be seen that a very small amount of additional dredging, as indicated by the dotted line to the south, will give access to this dock and begin the basin as well.

BUILDING AND LAUNCHING WAYS.

In previous considerations of the Schmoele tract it has been proposed to locate a building and launching ways just west of the site shown for the proposed dry dock. This is for the obvious reason of securing an unobstructed launch up stream. A test should be applied to this proposition. A building and launching ways will occupy about 600 feet of water-front and extend back 1000 feet, thus taking up a large and valuable territory. It will limit the development of dry docks in this ultimately central portion of the yard, and prevent their concentration in one group. It might be years before an appropriation could be secured for constructing the launching ways, and years before their use after

being built. If used at all, there may be long periods between when the launching ways lie idle and deteriorating. As every first-class navy yard should be prepared to build a ship, this test, though severe, does not do away with the building and launching ways, for which there is no better location than that proposed under present methods of ship-building.

DRY DOCK FOR REPAIRS AND CONSTRUCTION.

By using a method not yet practiced in this country, the building and launching ways may be eliminated. This method is to build the ship in a dry dock, and this dock may be the new one proposed, a succeeding one, or there may be more than one.

Such a dock should be somewhat different from the present standard structures in concrete and stone. In general, it should have well-sloping sides with continuous small altars similar to those in the old wooden dry docks, for convenience of shoring and staging, and for light, air, and easy access. The entrance should have two caissons, first for extra protection against flooding, and second for preservation. The inner caisson being generally dry admits of continuous preservation; it also permits turning around the outer caisson for periodical painting and preservation. This makes a structure that is always useful for docking ships when not used for building them. It would be somewhat more expensive than the ordinary type of dock, but the difference would be less than the cost of the building ways, and the structure would be continually giving a return on the investment. A few incidental advantages would be as follows: The regular dry dock traveling cranes could be used in building operations for handling materials of construction. The ship would be built on an even keel. All launching strains would be avoided. The ship could be more nearly, if not entirely, completed before being floated.

The policy of the Government has been so far, and probably always will be, not to build any great number of ships in navy yards, but to be prepared to do so, if necessary. Such preparedness at the Norfolk Yard to the extent of reserving space for ordinary building and launching ways is evidently a hindrance to development for repair purposes. It would remove new resources on the Schmoele tract a greater distance from the existing resources in the old yard, and would ordinarily increase inconvenience and expense. A ship-building dry dock would fit any policy or change of policy that the Government might adopt.

That the general idea for a dry dock for building purposes is practical and a success is shown by the fact that the Maryland Steel Company built the New Orleans Government floating dry dock in an unlined earthen basin closed by a dam. When the floating dock was completed the basin was flooded and the dam removed by dredging. Some of the reasons for the procedure were those enumerated above, and it was so successful that the same company repeated it in building the Government floating dry dock Dewey for the Philippines.

It is neither wise nor desirable to go further with a proposed development of the Schmoele tract in this treatment, though the temptation is great. No harm, however, can result from continuous study, but the results should first be used as a target for general criticism and discussion, and if the basic principles are correctly developed, the future details will not be likely to go far wrong. The older portion of the yard should and must be utilized as long as possible, and a careful study by a permanent navy yard development board will reveal many improvements that can be made in old buildings and constructions, and in their disposition.

TIMBER DRY DOCK.

A matter in the old yard that will claim attention in a very few years is the timber dry dock, No. 2. The dock will either require rebuilding or abandonment. If rebuilt in its present length, it will not even accommodate present ships. To lengthen it materially will destroy a building recently repaired and made available for many more years. As the rebuilding of a dry dock has so far proved of questionable value, consideration will probably be given to converting this dry dock into a slip. This would be a comparatively simple and certain proceeding, and any slip is available for the craft it will accommodate and increases water-front. Should a slip be made, a much freer communication can also be had between the old yard and the Schmoele tract by making the slip somewhat shorter than the dock.

BERTHING SLIPS.

It may not be amiss at this point to invite attention to the fact that additional slips are possible in the future in the northern part of the old yard, as indicated. The consideration of these slips is ventured, as they do not displace a single new or valuable build-

ing, or one that will not require or merit removal in a reasonable time. The consideration is also suggested, as present lack of berthing space is one of the defects of the yard. The present fitting-out basin, which is comparatively new and occupies the site of the old timber basin, is the most valuable improvement of recent years, next to dry dock No. 3, which has just been completed. It is apparent that these slips could be commenced at once and about one-third completed with little disturbance of present conditions. They would become at once available and could be completed in the future, as conditions permitted. The indiscriminate renewal of old buildings in this locality without broad consideration of the subject will forestall these slips. It is to be noted that they would take ships out of the main channel and are opposite the point where the widening of the channel is under Government control.

ST. HELENA.

A matter requiring general consideration in the development of the Norfolk Navy Yard is the disposal of the St. Helena tract. It is seen that the recommendations of the board of 1869 in regard to this tract have not been realized in any way, and the reasons are apparent why none of the resources of the yard proper will ever develop on that side of the river on account of the difficulty and inconvenience of communication.

Within the past few years there has grown up at St. Helena one of the most successful and efficient training stations for apprentice seamen that the navy possesses. This development has been without recognition by Congress, and is largely due to the energy and efficiency of the officers in command of the receiving ships and the able personnel under their command, who have had direct charge of this training station. The bureaus of the Department have given what little aid they could in this matter, and the results are worthy of study and consideration. The apprentice seamen are accommodated in temporary buildings and tent houses, with the result that they become strong and hardy and are not spoiled by undue luxury for the life they must soon take up on board ship. The climate permits of continuous drill and instruction the year round, both on land and water. The proximity of the navy yard and the frequent visits of ships of war all go to familiarize and educate the apprentice seamen with the life before him. The adjacent yard permits of the practical instruction in its shops of those of a mechanical aptitude.

An attempt was made in recent years to develop a torpedo-craft station on the southern end of St. Helena, but its greatest inconvenience was its separation from the main yard on which it was dependent for all matters of greater importance, and it was recently removed to the navy yard at Charleston, S. C. The training station was prompt to occupy this vacated territory and convert the only building of permanence on that side, a storehouse for torpedo-boat outfits, building No. 81, into a mess hall and offices.

The constantly increasing success of this self-made training station seems to point to a successful development of St. Helena in this line, and a slight recognition from Congress will put it on a permanent footing and make it the best and most attractive in the navy. At present it is constantly demanding help from the main yard, from which it receives assistance with reluctance, as the two interests are conflicting. With special appropriations for its maintenance and development, and separation from the yard as a distinct command, its future is one of assured success.

The development of St. Helena as a recognized training station points to one use of the land south of it, if acquired by the Government, as it may be added to such a station. Other uses for this property would be for coal and fuel oil storage, and the storage of unloaded projectiles, all of which matters are better out of a working yard than in.

In any event, St. Helena has afforded a protection to the waterfront of the navy yard that is worth greatly more than was paid for the property. The necessity for widening the channel has already been reached, and to have been compelled to cut back into the yard proper would have cost many times the original value of the tract opposite. It can be seen on Plate 3 that by cutting into St. Helena and making a basin in the Schmoele tract the necessity for the land south of St. Helena is not absolute; nevertheless, the time is ripe for the consideration of its purchase before it greatly increases in value.

ADVANTAGES.

Some of the points of advantage of the Norfolk Navy Yard and its vicinity were pointed out by the board of 1869, and many of them are as true now as they were then and will probably always be so. Some other practical points are worthy of mention and are as follows: There are no strong tidal or other currents at the

yard, so that the handling of ships is not hampered thereby. The average range of tide is only about two and a half feet, so that there is no difficulty with moorings, and the cost of water-front constructions, foundations, and dry docks is reduced to the least amount. There is very little silting of the channel, so that the necessary depths are readily obtained by dredging and easily and economically maintained. The low range of tide also renders excessive dredging unnecessary for low-water conditions.

The Norfolk Navy Yard now ranks second in importance in the naval establishment. With its geographical and strategic advantages and its already acquired area, it is entirely possible that it may sometime rank first amongst the navy yards. The basic measure of value for a navy yard is its dry dock facilities and possibilities, and it is apparent that at Norfolk the possible number of dry docks is large.

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U. S. NAVAL INSTITUTE, ANNAPOLIS, MD.

THE NAVAL ACADEMY PRACTICE CRUISE.

ITS ORGANIZATION ALONG MODERN LINES.

By LIEUTENANT PAUL FOLEY, U. S. Navy.

The history of the United States Naval Academy is a gratifying illustration of the triumph of thought as represented in the development of its theoretical course of instruction. This, beginning without guide of any kind, has in a period of sixty-five years been carried to such a degree of perfection that, while it may appear upon superficial examination to be susceptible of improvement, has yet within the very recent period of five years, withstood the rigid scrutiny of a board of eminent naval officers appointed to revise, and adapt it to modern conditions.

The story of the practical course of instruction as represented by the practice cruise is no such story of progressive development. On the contrary, since the year 1900 at least it has been a story of more or less steady retrogression. In the early days of the Naval Academy, the days of the sailing vessel, there was no occasion to devote any particular thought to the practice cruise; the occupation of the moment on shipboard, be it what it might, was bound to be practical. The practice cruises were conducted on the broadest professional lines. It is not too much to say that the ships were as active, if not more active, than the cruising vessels of the fleet. From the report of the practice ship *Preble*, under date of September, 1855, we quote:

> The ship has been got under way and anchored twenty-seven times. The courses have been reefed once, and the topsails twenty-seven times, independently of the regular exercises. The rudder has been shipped and unshipped twice. The foremast, with the exception of the lower rigging, has been unrigged and rigged. There have been fired at the target by the students and crew nine shot and three shell while the ship was under way, and forty-three shot and twelve shell while the ship was at anchor."

From the report of the practice ship *Plymouth*, under date of 1860, we quote:

> The cry of "MAN OVERBOARD" was once given when the ship was going at the rate of eight knots. The life-buoy was let go, the boat lowered, the ship brought to, the buoy picked up, the boat alongside again, and hoisted in her place, ship filled away, and standing on her course under all plain sail, in seven minutes and twenty seconds from the time of first alarm.

At a later date, 1871, the *Constellation* reports:

> The topsails have been single-reefed in fifty-eight seconds from order "LAY OUT" to order "LAY DOWN FROM ALOFT." Sail has been reduced from royals in one minute and five seconds. Single reefs have been shaken out and topsails hoisted in a minute and a half."

We have passed from the sailing ship, and one by one we have let go of the things that belonged to the sailing days, realizing that they were out of touch with modern conditions; but as we have let go, there was an ever increasing need for thought where thought has not been given, and the practice cruise has gradually degenerated to a point where it is an open question whether it is not more of a hindrance than a help. The summer cruise of 1909 was typical of all practice cruises of recent years. When the battleship fleet was assembled at Provincetown, concerned with problems of torpedo and submarine defense, the midshipmen's practice squadron, consisting of two monitors, two obselete cruisers, and a sloop-of-war, was assembled in the vicinity of New London, concerned with no more serious problem than the invasion of the summer hotel; and when during the month of September the fleet was engaged in target practice on the Southern Drill Grounds, the practice ships were out of commission and the midshipmen scattered throughout the country on leave. Never at any time had they been in touch with the navy as it is, or with service conditions as they are. The practice ships were not even painted the fleet color.

While it has become a habit of mind of the service to attribute every shortcoming observed in the Naval Academy product to the course of theoretical instruction there, study of the facts seems to suggest that the deficiency lies in his practical rather than in his theoretical education, and that the remedy lies in the reformation of the practice cruise pure and simple. How to do this, how best to co-ordinate the practical afloat with the theoretical ashore is a very interesting question. It will be considered under three heads:

I. Number and type of ship.
II. Organization of ship.
III. Period and place of cruise.

NUMBER AND TYPE OF SHIP.

It is of first importance that the organization of the student body of the Naval Academy, that of one brigade and two battalions, which has been evolved from the older organization along the lines of a ship-of-war, should be carried afloat, and preserved intact. If the organization does not lend itself to this end, it is a rotten organization, and the sooner we rid ourselves of it the better.

If we are satisfied with the organization, then to carry it afloat we must embark either in one ship big enough to absorb the entire brigade, or in two sister ships, one for each battalion.

It goes without saying that a ship which can absorb three hundred and perhaps even six hundred midshipmen must be a vessel of some displacement.

In addition to the matter of size, vessels which are to be of any real value as practice ships must satisfy the requirements of the professional departments of the Naval Academy in all of the following particulars:

STEAM DEPARTMENT.

(A) Modern Babcock and Wilcox boilers.

(B) Large firerooms, and sufficient in number to permit some boilers to be always idle and open for instructional purposes, while others are closed and in use.

(C) Modern four-cylinder engines, and engine rooms big enough to absorb fifty or sixty midshipmen without danger to life and limb.

(D) Modern pumps.

(E) Modern arrangement of piping system throughout, by which is meant piping installed within five years.

(F) Modern arrangement of evaporators, distillers, traps, machine shop, ice machine, etc.

ORDNANCE DEPARTMENT.

(A) Modern electric-controlled, balanced turrets equipped with all modern electrical devices.

(B) Modern intermediate battery, mounts, sights, ammunition hoists, and supply.

(D) Modern fire-control masts, fire-control system, and interior communications, range finders, torpedo tubes, torpedoes, mines, air compressors, etc.

ELECTRICAL DEPARTMENT.

(A) Large dynamo rooms, with modern 125-volt dynamos.
(B) Modern wiring system, switchboard, etc.
(C) Modern search-lights, cranes, winches.
(D) Wireless installation.
(E) Interior electrical communications and safety devices generally.

DEPARTMENT OF NAVAL CONSTRUCTION.

(A) Modern subdivision of compartments throughout.
(B) Distribution of armor.
(C) Drainage system.
(D) Ventilating system.
(E) Water-tight doors, electric long-arm system.
(F) Anchor engine, steering engine.
(G) Cranes, winches.

SEAMANSHIP AND NAVIGATION.

(A) Modern bridge equipment, mechanical devices, peloruses, etc.
(B) Modern signal apparatus.
(C) Sounding machines, patent log, binnacles.
(D) Wireless telephone.
(E) Submarine bell.

We have at hand on the Atlantic Coast two ships which meet every requirement both of size and equipment outlined above. They are the *North Carolina* and *Montana*.

The older battleships, the *Massachusetts*, the *Indiana*, and the *Iowa*, do not satisfy them. Their turrets and turret control are neither modern nor uniform, their intermediate batteries are neither modern nor uniform, their boilers are not modern or uniform, their engines, piping system, and electric installation are not uniform; in short, they represent throughout an older school of naval architecture. Their interior arrangement and fittings are not those illustrated in the text-books which the midshipmen have used.

ORGANIZATION OF SHIP.

Assuming that the *North Carolina* and the *Montana* have been designated as practice ships, transfer to each one battalion of midshipmen, with their appropriate tactical officers. Make the company organization ashore the basis of the divisional organization afloat, and at once we have all the elements not only of a sound, but also of a flexible military organization, an organization which will segregate itself either into sections by classes for in-

structional purposes, or into graded military units for drill, purely as a matter of habit and without conscious effort on the part of any one.

By assigning to each ship one-third of the total number of officers on duty at the Academy, giving to each vessel a total of about twenty-six line officers, as opposed to previous practice of about six, and by selecting these officers systematically from all academic departments, we at once supplement our already strong military organization with an equally strong educational organization.

The enormous volume of work accomplished in an academic year at the Naval Academy is due largely to the careful preliminary thought bestowed upon it. Before the call to evening study is sounded on the first night of the academic year, the employment of every hour of every day for every class is in print. Nothing is left to chance or the impulse of the moment. These methods must be applied to the practice cruise before we can hope for any really tangible results; that they have not been employed in recent years is well known to every officer who has made a cruise in a practice ship, but the undertaking is not so difficult as at first sight it might appear.

The recognized subdivision of time among the several professional departments is one-third to seamanship and navigation combined; one-third to ordnance and electricity combined; and one-third to steam engineering. This subdivision readily accommodates itself to the Naval Academy organization, as by embarking a single battalion we have six companies symmetrically distributed as to class—or two companies at a time detailed to each of three instructional groups. It accommodates itself also to the period of the cruise, which, omitting Sundays and holidays, and one week for final examinations, continues for nine weeks—or three weeks for each instructional group.

The course of instruction in each group must therefore be arranged in twenty-one lessons, or instruction sheets, which must be in print before the cruise begins.

Such instruction sheets may be planned on either of two systems—one best known to every graduate as the "Sketch and Describe" system; the other, of more recent growth, as the "Ask and Inquire" system.

The "Sketch and Describe" system is beautifully adapted to section-room work, but for practical work afloat is about as use-

less as a system can be. No human being could sketch or describe any piece of machinery by looking at it as erected; to sketch it properly he must have resort to a blue print or a text-book, which, in general, is the very thing least to be desired. It will be a joyous day when the "Sketch and Describe" system disappears from the cruise. The time lost in struggling with triangles, erasers, pencils and a lot of useless writing is out of all proportion to value received.

The "Ask and Inquire" system, which consists in developing all the information which a student should know about any given subject by a series of questions, has, in practice, given very gratifying results. It tends to keep the student at all times away from text-books; it takes every advantage of the natural inquisitiveness of youth instead of stifling that inquisitiveness; and it cultivates habits of exact observation that are bound to be of great value in after life.

The difference between the two systems may be further illustrated as follows: Subject, Steam Engineering—Main Feed Pump. By the "Sketch and Describe" system it is thus dismissed, "Sketch and describe a main feed pump as installed on this vessel," and a mental picture of the product is stamped for all time in the brain of every line officer. By the "Ask and Inquire" system the same subject would be handled thus:

MAIN FEED PUMPS.

Read Barton, page 338.

Main feed pumps have fresh water connections only. They draw from the feed tanks and reserve feed tanks, and discharge to the main feed line, through the heater, or by the heater as desired; and to the reserve feed tanks, the delivery pipe to the reserve feed tanks being a branch of the main feed pipe with a valve in it.

Find out:

(A) The number, location, and make of the main feed pumps of this vessel.

(B) Locate the maker's name-plate on pump, and read it carefully. This data is sufficient to identify pump, and secure new parts.

(C) Locate steam and exhaust pipes of steam end, and cylinder drains.

(D) Locate pressure gage for steam end.

WATER END.

(A) Is it single or double acting pump?

(B) Locate suction from feed tanks and suction from reserve feed tanks.

(C) Are there any valves or suctions other than those at the pump?

(D) Locate discharge to the main feed line direct, and discharge through heater.

(E) Locate discharge to the reserve feed tanks.

(F) Locate spring relief valves. Where do they discharge to?

(G) How many air chambers are there, and where are they placed?

(H) Are the air chambers fitted with cocks at the top, and if so, what are they used for?

(K) Locate pressure gage for discharge end of pump.

(L) What is the pet cock on the top of water chamber for?

(M) How are the head valves of the water chamber drained?

(N) Is there a blank flange connection, and if so, why?

(O) Why are pump gages graduated to record pressures considerably in excess of the designed working pressure of the boiler?

(P) When a pump is not in operation, the cylinder drains should be kept closed; why?

Read Barton, page 509, Art. Government Navy, 1608, par. 7.

The amount of ground that can be covered by this method is very great. Twenty-one instruction sheets, each numbering twenty questions, gives a total of four hundred for four classes, a grand total of sixteen hundred. The difficulty of producing off-hand sixteen hundred questions in any professional subject is apparent on the face, but until this colossal task has been accomplished we have no scientific organization. In a way it is the last analysis of the whole subject.

By limiting the crew of the practice ship strictly to chief petty officers and servants, we strengthen the organization still further by making it possible to concentrate the entire brigade in a single ship, and giving fifty-two officers available for duty instead of the previous twenty-six.

The idea of eliminating the ratings in the crew and filling them by the student body—seamen, ordinary seamen, and coal-passers from the fourth class men, and petty officers from the higher classes—is not new. It first found expression in a report of Captain Breese, Commandant of Midshipmen, in 1874, from which we quote the following:

> The practice ship has an ordinary, picked-up crew allotted to her; it may be good, indifferent or bad. On this cruise it has been exceptionally good, and with an exceptionally good crew of petty officers. The crews are put aboard, at most, a few weeks before the officers can take them regularly in hand and are well or indifferently shaken down by the time the midshipmen come on board.
>
> The third class man now receives his first impressions of his profession; and a first class man, with professional intelligence enough, as he thinks,

to comprehend, takes this ship as his standard—a newly commissioned American ship-of-war, with a crew as above alluded to, too much crowded for comfort, and more or less harrassed by the extra duties imposed upon them by the character of the ship. Both classes form a part of the ship's company in all respects, save cleaning the ship. Their duties, with this exception, are identical with those of the crew. What more natural than for a third class man to adopt the seaman as his standard, to derive his professional notions from him, and a first class man to struggle against the habits acquired on his last cruise, and endeavor to fit himself as an officer? And how hard for him to do so, when, for the exception of the time on his particular detail as midshipman of the watch, or officer-of-the-deck, he is still a foremast hand!

With these duties, it seems to me, there must go the notions and feelings of the seaman, and which, I think, would be a most admirable system as establishing the true sympathy that should exist between officer and man, arising from the true knowledge of a seaman's duty and condition, did we but retain our men in the service. But our crews have no established character, no homogeneity, and no feelings in common with each other; they come together accidentally, have no preference for the service, make use of it for the time being, ready to desert at a moment's temptation, and hence create an altogether false impression on the young midshipman. The midshipmen find themselves pulling beside and sandwiched in between the servants. How distasteful this is every graduate of the Academy can speak. How much less distasteful when working beside the seamen only, if among themselves, taken as part of the instruction, cheerfully and willingly. Where unity of duty on the part of the crew and the midshipmen exists, there must be conformity of sentiment. The utterances of the disreputable are forced upon the ears of the midshipmen, and I feel satisfied that, though every endeavor is made to separate the midshipmen from the men, the morals of the latter affect the former, and to no small extent.

In the long run we are bound to eliminate the crew. It were better to eliminate it in the first instance. The Naval Academy is the only technical school in the world where the students are allowed to believe that manual labor is undignified. Some of its contradictions and nice distinctions are quite ludicrous. For example, in the steam department tradition has it that it is proper to run a file and a lathe and a forge, in short to learn to work with the hands, but in the seamanship department it is undignified to run a holystone. In the days of the deep-sea cruise, it was becoming and proper for the midshipmen to scrub a hat, a lanyard, or a handkerchief—but a jumper—never. What rot all this is! How can anything that pertains to the well-being of a ship be undignified?

The issue was clearly seen at the close of the first cruise of record at the Naval Academy, the following humourous extracts

being taken from a report of Commander Greene under date of 1855:

A misconception of their true position, in considering themselves officers, and consequently entitled to the deference due officers, has, I apprehend, caused them to confound their probationary state with that for which they are preparing. Appreciating and acknowledging their general good conduct, attention to duty, and efficient services during the cruise, I deem it important and necessary for a full development of the usefulness of a practice ship, that they should have any erroneous ideas they may entertain in regard to their station and duty removed, and that they should be impressed in some official manner with the propriety and obligation of their performing, when embarked, all of the duties appertaining to a seaman as well as those of an officer.

The character of a seaman's duties may have changed, but the necessity of performing them has not changed and will never change if we are to send out graduates strengthened by the self-confidence begot of experience instead of the conceit begot of Naval Academy hops.

TIME AND CRUISING GROUND.

The cruising ground of the practice squadron should be that of the battleship fleet. The fleet is the navy, and mere contact with the fleet, and the atmosphere of the fleet, is that which the midshipmen as a body need most of all. More essential is it that the midshipmen be present at the fall target practice of the fleet. There can be nothing better calculated to impress the youthful mind with the responsibilities and the serious side of the naval profession than the night battle practice of one of the heavy ships. By giving the midshipmen leave in June at the close of the academic year, and beginning the cruise in July, it is quite feasible to extend the cruise over into September. As cruises are now conducted from June through August, one of the three months is consumed in resting from the routine of the academic year, and a second is consumed largely in thinking about leave. By beginning in July, the academic year would not end in the unmilitary whirl of confusion that it now does—officers could settle their families in peace and quiet for the summer, and the preliminary preparations of the practice ship would be carried out as a duty in itself, rather than as an incident in connection with annual examinations, June week exercises, and other work purely academic in nature.

SUMMARY OF RECOMMENDATIONS.

1. Use the *North Carolina* and *Montana* as practice ships, one battalion to each ship.

2. Make the company organization ashore the divisional organization afloat.

3. Watch officers of practice vessel to be the discipline officers; and officers of academic departments to continue in same departments afloat. The combined wardroom, steerage, and warrant officers' quarters of the ships in view would afford accommodation for a considerable number of officers.

4. Organize the ship's company from the midshipmen—making them perform all the duties of all the enlisted men—master-at-arms, boatswain's mates, gunner's mates, quartermasters, artificers, seamen, coal passers, etc., to which arrangement the company organization lends itself most admirably.

5. As soon as the midshipmen are educated up to a point permitting it, eliminate the crew entirely, with the exception of a very few chief petty officers of proven ability, and the servants. The latter class could be extended sufficiently to do all necessary menial work.

6. Predetermine the amount of time to be alloted to the professional departments and have the specific character of the instruction for every day and class outlined in print before the cruise begins. To accomplish this the first year, detach one officer of experience in each academic department and let him devote two or three months of undivided time toward producing instruction sheets.

7. Begin the cruise in July instead of June and extend it through September, giving officers and midshipmen the benefit of the fall target practice.

8. Keep the practice ships in constant touch with the battleship fleet, so that the students can keep in touch with the atmosphere of the fleet.

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U. S. NAVAL INSTITUTE, ANNAPOLIS, MD.

REVOLVER SHOOTING.

By MIDSHIPMEN W. A. LEE, JR., and A. D. DENNEY, U. S. Navy.

Accurate revolver shooting is so easy to learn and so important in an officer's profession that it seems it should not be neglected as it has been in the training of officers for the service. This accomplishment is not limited to a few gifted artists, born to shoot a revolver, but is easily within reach of any ordinary man who is willing to give to it a little work and attention. In most cases a little conscientious practice, properly directed, will make a poor shot into an expert; that is, progress at the beginning is so rapid and the results are so obvious that mere interest changes to fascination and one keeps on shooting and developing until he reaches the highest stages of the shooting game.

It is the object of this article to point out the details of a system used to attain the best results with a service gun.

Remember first that the revolver is a very dangerous weapon, especially when *not loaded*.

Position of the Body.—The proper position is to stand facing nearly at right angles to the target, the left heel about 3 inches to the left of, and about 12 inches to 18 inches to the rear of the right heel; the feet in the most comfortable position to suit the individual firing. (See Fig. 1.) Take the weight about equally on both feet, throw the abdomen slightly forward, and brace the body with left hand grasping left hip; right arm fully extended toward the target.

The conventional position—right arm bent, hand grasping lower part of stock, thumb around handle with the little finger underneath—cramps the arm and prevents the best control of the weapon.

The method of holding the piece is very important. The proper position is shown in Figs. 2, 3, 4, 5. Grasp the piece lightly, hand high on stock, entire thumb (all three joints) to the left of and extending along the upper part of the frame. (See Figs. 2, 3, 5.)

FIG. 1.

In sighting, place the tip of the front sight even with the top of the rear notch, then bring it under the bull's-eye, leaving a thin line of white. Do not cant (Fig. 5).

With sights so aligned, gradually tighten the grip, increasing the pressure on the trigger without independent movement of the trigger finger. It will be found almost impossible to keep "on" for any length of time, so there must be absolute control over the trigger finger to enable one to fire at the proper instant and to prevent firing when not "on." After continued practice the trigger finger works almost involuntarily, so that when you *will* to fire you *do* fire without being conscious of any additional pressure at

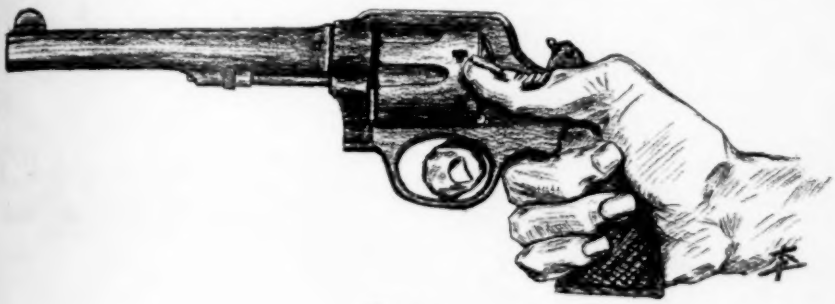

FIG. 2.

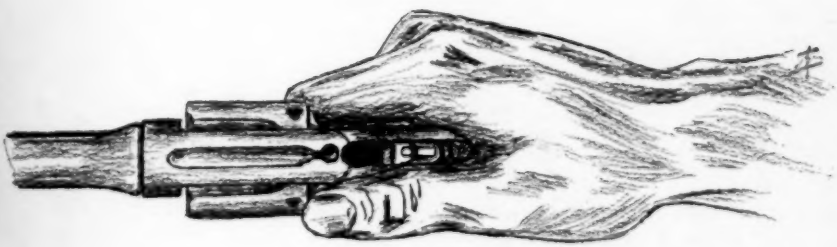

FIG. 3.

that instant. It is well to fire as soon as the sights are steady on the bull's-eye, for the arm soon tires and causes the piece to "bobble." If you are not able to get the shot off before the arm tires, take a rest and try again; don't let it go when you know you are not "on."

Acquire accuracy before you try for speed.

Rapid Fire.—In this method of firing the single-action should always be used. Commence squeezing the trigger as soon as the piece is cocked, gradually increasing the pressure so that by the time the sights are aligned on the bull's-eye the trigger is pulled.

This is also a good plan to follow when firing in a wind. In rapid fire take a coarse sight and risk no chance of losing your front sight in the middle of a string. Most of the time is used in cocking the piece, and the following method is found to be the fastest: As soon as the piece is fired allow it to jump up with the recoil, release the trigger, place the thumb on the hammer, loosen the grip, allowing the muzzle to swing to the right bringing the thumb across the hammer, draw hammer back. When the piece is cocked let the thumb slip over to the position on the left side as the hand is closed. The position of the arm is not changed and the sights will be found on, or nearly on, the bull's-eye as soon as the hand is closed.

FIG. 4.

Practice is all important, and by practice is not meant the firing of a great number of shots for the sole object of making large scores. Practice is not measured by the number of shots fired, and the score is the last thing to be considered.

After snapping the piece a number of times to get the position, fire a string of shots and plot those fired when the aim was good. Find the center of impact and note its position with reference to the point of aim. The bunch may be moved to the right by increasing the pressure of the thumb on the side of the piece, to the the left by decreasing it. If the bunch falls off the bull's-eye when the aim was good then the holding is at fault and can be corrected with proper attention.

Flinching is the anticipation of the recoil and the contracting of of the muscles to withstand the expected shock. This is the most

common, and the hardest to master, of all the faults a revolver has to contend with. It is shown in its worst form by the beginner shooting into the ground near his toes. It is extremely hard to overcome entirely; that is, to be able to hold as well when firing as when snapping the empty piece. The best way to over-

FIG. 5.

come flinching is to be *sure* you can hold on and snap, then keep the idea before you that you *must hold the same* when you know it is going to fire. Get the position so that you are not afraid of the recoil, hold the gun lightly, and practice. A good method, much used, is to fill some of the chambers and leave some empty; then give the cylinder a whirl and close it so that you will not know whether you are going to fire, or to snap when you pull the

trigger—you will notice the flinch when you strike an empty chamber. Correct it.

As soon as the shot can be placed in a small, well placed bunch, the actual firing may be discontinued, except that a few strings should be fired from time to time to prevent growing away from the position learned.

The firing is now superseded by snapping at the target. This gives good practice and has the advantage of being cheap and convenient.

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WHEN WAS OUR NAVY FOUNDED?

A CRITICISM OF AUGUSTUS C. BUELL'S "PAUL JONES, FOUNDER OF THE AMERICAN NAVY."[1]

By CHARLES OSCAR PAULLIN.

Few more interesting volumes relating to American history have been recently written than Mr. Augustus C. Buell's book, "Paul Jones, Founder of the American Navy, A History," published in 1900, in two volumes. This pleasing work possesses many graces of style and presentation which the dry-as-dust historians might imitate to their own pecuniary advantage and to the pleasure of their readers. But on the other hand it would have been saved from many misstatements had it been brought to those tests for reliability of sources and accuracy of names, dates and facts, which the scientific historian regularly applies to his duller writings. The most faulty part of the book is Chapter II of Volume I, entitled "Founding the American Navy," which seems to be based upon a spurious manuscript.

[1] I wrote this criticism in the fall of 1903. As it has had a limited circulation in manuscript, and as the controversy over Mr. Buell's book is not likely soon to die out, I have thought it best to record in print a judgment expressed more than six years ago. Moreover, students of American history should be placed on their guard respecting a work that is now never used as an authority by the best-informed writers. Unfortunately it has already caused many misconceptions respecting the history of the period of which it treats. A comment found in Elroy M. Avery's "A History of the United States and its People," Volume VI, page 465, may be accepted without reservation: "Interesting but inaccurate, a mingling of fact and fiction."

Soon after the publication of Mr. Buell's book I wrote to him asking him several questions respecting the sources of his information and inquiring particularly where I might find the Jones-Hewes papers from which he

It will facilitate the discussion if we first give a brief résumé of the chief events relating to the establishment of the Revolutionary Navy, using simply the statements known and accepted before the appearance of Mr. Buell's book.

On October 5, 1775, the Continental Congress appointed a committee of three (Journals of the Continental Congress, October 5), which according to John Adams consisted of himself, John Langdon of New Hampshire, and Silas Deane of Connecticut (Works of John Adams, III, 7), to prepare a plan for intercepting two British brigs loaded with arms, powder and other warlike stores. A report which this committee made on October 6 was acted upon on October 13, when Congress decided to fit out two armed vessels and appointed a committee consisting of Deane, Langdon and Christopher Gadsden of South Carolina to estimate the expense to be incurred in fitting out the vessels (Journals, October 6 and 13). On October 30 this latter committee, which was later called the Naval Committee, made a report. Congress now ordered two more vessels to be prepared for sea, and added

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quotes in Volume I, pages 32-42. Under date of March 14, 1901, he replied in part as follows: "I am not in a position to aid you in securing access to the original documents from which I quoted in my History of Paul Jones. When I had access to the Hewes papers (for an account of Buell's discovery of the Hewes papers, see the *Washington Post*, July 16, 1905, part 4, page 2) they were in the possession of the Hon. Kenneth Rayner, of North Carolina, formerly Solicitor-General of the United States. He died some years ago, and I do not know what disposition was made of the papers." Thinking possibly that the widow of Mr. Rayner might have some knowledge of the Hewes papers, I addressed a letter of inquiry to her, and she replied from Fort Worth, Texas, under date of November 2, 1903, as follows: "I am sorry to disappoint you as to the manuscript you refer to. I do not recollect ever to have seen such a paper, and I am sure that my husband never had it, or I would surely have known of it. Mr. Buell must be mistaken in thinking he saw such a manuscript among my husband's papers."

Mr. Buell apparently did not expect his work to be taken too seriously, and he seems to have regarded himself more as a journalistic writer than as a careful historian. To Mr. George Canby, who, like myself, wrote to him inquiring after original documents, he, in a letter dated October 4, 1901, thus explains his inability to give the requested information: "The fact is that when compiling the matter for my history I never had any idea of being made a defendant in the premises, or being called upon to prove anything by proffer of original document. Indeed, I was not at that time sure that I would ever publish it. As a result I was careless about preserving documentary evidence. For this reason, about all I can do now

four additional members to the former committee, Stephen Hopkins of Rhode Island, Joseph Hewes of North Carolina, R. H. Lee of Virginia and John Adams of Massachusetts (Journals, October 30). The Naval Committee during October, November and December, 1775, drew up rules and regulations for the navy, obtained a fleet of eight vessels and prepared them for sea, and officered them by making Esek Hopkins of Rhode Island commander-in-chief, and by appointing four captains, five first lieutenants, five second lieutenants and three third lieutenants. John Paul Jones was first on the list of first lieutenants (Journals, December 22). On December 14, 1775, Congress appointed a committee of thirteen to take charge of the building of thirteen frigates (Journals, December 14). This new committee was called the Marine Committee, and by the spring of 1776 had superseded the Naval Committee as the naval executive of the Continental Congress.[2]

Mr. Buell's account differs from the above principally in two particulars: he places some three or four months earlier the ap-

is to say that those who take sufficient interest in my statements to read them must accept them as authority, so far as I am concerned, without 'going behind the returns'" (*Boston Transcript*, July 1, 1905, page 24).

Those who wish to pursue this subject further are referred to the following writings which contain comments unfavorable to Mr. Buell's book: Joseph Foster, The Portsmouth Flag, in the *Portsmouth* (N. H.) *Herald*, April 20 (?), 1905; George Canby, Paul Jones's Flag, in the *Boston Transcript*, July 1, 1905, page 24; P. R. Alger, The Naval Academy Miniature of John Paul Jones, in the *United States Naval Institute*, XXXI (Sept., 1905), 585-597; Joseph Foster, in "Notes and Queries" in the *Boston Transcript*, December 23, 1905, page 23; Mrs. Reginald De Koven, A Fictitious Paul Jones Masquerading as the Real, in the *New York Times*, June 10, 1906, part 3, page 1; Junius Davis, Some Facts About Paul Jones, 1906; Mrs. A. B. Hall, Reward Offered, in *New Hampshire Genealogical Record*, IV (April, 1907), 82; Joseph Foster, in "Notes and Queries" in the *Boston Transcript*, August 17, 1907, page 20; Charles W. Stewart to Frank W. Hackett, September 15, 1908, quoted in Hackett's Deck and Field, 191-192; Elroy M. Avery, A History of the United States and Its People, VI, (1909), 465; Frank W. Hackett, Deck and Field (1909), 185-192; Mrs. Anna (Mrs. Reginald) De Koven, Paul Jones, in the *New York Times*, August 29, 1909, page 8; Albert Bushnell Hart, Imagination in History, in *American Historical Review*, XV (1910), 231-232.

[2] One member of the Marine Committee was Mr. Joseph Hewes of North Carolina, who has been referred to in a previous note as a correspondent of Jones.

pointment of the first naval committee, and he gives John Paul Jones a much more prominent part in the obtaining and fitting out of vessels and in the organizing of the navy than hitherto he had been supposed to have had.

Buell says that about May 1, 1775, two frigates of the French Navy, commanded by Commodore de Kersaint, with "the Sailor Prince of France, Louis Philippe Joseph, Duke de Chartres," second in command (who had been selected to become High Admiral of France), put into Hampton Roads, Virginia. In May, 1775, Jones visited these two frigates and "made no secret with the young Duke and Commodore Kersaint that his object was to obtain information as to the plan, design and construction of hull, arrangement of battery, spars, rig and other technical particulars, for the guidance of the Marine Department of the new American Government, which he assured them would be formed within two months, and which would fight it out with England to the bitter end" (Buell, I, 25-26).

Now it is most astonishing, as has been pointed out by Mr. William G. Stanard in the Virginia Magazine of History and Biography (VIII, 444), that the *Virginia Gazette*, published at Williamsburg, Virginia, should take no notice of this most conspicuous event. The writer has not only corroborated Mr. Stanard's conclusions by inspecting the files of the *Virginia Gazette*, but he has also searched the files of several other colonial papers of the period, which he found profuse in their announcements of the arrival of insignificant craft of all sorts, but absolutely silent respecting the improbable incident of the French vessels.

Buell next informs us, after referring to the meeting of the Continental Congress on May 10, 1775, that "on June 14 a provisional Marine or Naval Committee was appointed 'to consider, inquire and report with respect to organization of a naval force.' At first this committee consisted of Robert Morris, chairman; Philip Livingston, Benjamin Harrison, John Hancock, Joseph Hewes and Nicholas Van Dyke, members" (Buell, I, 27). At a session held on June 24, the committee on the motion of Mr. Hewes, authorized the chairman "to invite John Paul Jones, Esquire, gent., of Virginia, Master Mariner, to lay before the Committee such information and advice as may seem to him useful in assisting the said Committee to discharge its labors" (Buell, I, 27-28). It is certainly singular that neither the manuscript jour-

nals nor the manuscript secret journals of the Continental Congress, which are now in the Library of Congress, mentions the appointment of this committee. It is also singular that Robert Morris, the chairman of the committee, should not be a member of Congress at this time, not being chosen until November 3, 1775; and that Nicholas Van Dyke should also be a member of the committee, although he did not enter Congress until June 2, 1777 (Journals, November 6, 1775, and June 2, 1777).

John Adams in his autobiography reports a debate in Congress of October 6, 1775, and in his Notes of Debates, another of October 13. In each of these debates measures were under discussion which involved, as was thought, the establishment of a navy. Against such an undertaking the most strenuous opposition manifested itself. Adams says, speaking of the debate of October 5, "These formidable arguments and this terrible rhetoric were answered by us by the best reasons we could allege, and the great advantages of distressing the enemy, supplying ourselves and beginning a system of maritime and naval operations were presented in colors equally glowing and animated" (Works of John Adams, II, 463-464, III, 7-8). Now, according to Mr. Buell, at the time when these debates were taking place Congress had already, four months previously, appointed a Marine Committee; this committee had called to Philadelphia as its "master mariner" John Paul Jones and had chosen a commission of four merchant captains, of which Jones was the head, and this commission had surveyed sundry vessels, one of which at least the Marine Committee had bought, and the Marine Committee had ordered Jones to convert this vessel into a light frigate, etc. (Buell, I, 27-42). Now why should Congress be debating in October the feasibility of doing the very thing it had already done? According to Mr. Buell's narrative Congress had by October gone far towards creating a navy. It is impossible to harmonize this narrative with the autobiography and notes of John Adams. One or the other is at fault.

Mr. Buell's book, the statements of John Adams and John Paul Jones and the accounts of our Revolutionary Navy as given by many historians, agree that the first vessel purchased by Congress was the *Black Prince*, which was renamed the *Alfred*. Mr. Buell gives many interesting details respecting the *Black Prince*, some of which are at variance with other accounts of her and with well-

known facts. He says that she was built at Maryport, Cumberlandshire, England, about 1766, that she was employed in the North American trade and that in 1770 she was bought by a company of Philadelphia merchants trading to the East Indies (Buell, I, 29-30). These facts will have to be harmonized with the following: The *Black Prince* obtained a Philadelphia register on December 19, 1774 (Pa. Archives, 2d series, II, 668); two days later she sailed on her first voyage as a Philadelphia vessel (M. I. J. Griffin, Commodore John Barry, 20; Pennsylvania Packet, December 26, 1774); and no American merchantman visited the East Indies until after the Revolutionary War.[8] Mr. Buell says that her burden was 440 tons; the Pennsylvania Archives gives her burden as 200 tons. Buell says that in June, 1775, the *Black Prince* was at Philadelphia preparing for her third trip to the East Indies. The *Pennsylvania Packet* of May 8, 1775, informs us that she had just cleared for Falmouth, England, and in Griffin's Commodore John Barry, page 19, we learn that she arrived in London on June 7, 1775.

Concerning the work of John Paul Jones in fitting the *Black Prince* for sea, Mr. Buell says that "he hove her down at the Christian Street wharf, Philadelphia, in September, 1775" (Buell, I, 31). The *Pennsylvania Packet* of October 16, 1775, names this ship in its list of vessels arriving at Philadelphia during the past week. She was returning from her summer voyage to England. There is not the slightest doubt that when Jones "hove her down at the Christian Street wharf," she was some hundreds of miles from Philadelphia, sailing on the broad Atlantic.

According to Mr. Buell, John Paul Jones laid before the Marine Committee two documents, one "on personnel" under date of September 14, and the other "on materiel" under date of October 3, 1775. Grave doubt is cast upon the authenticity of both documents by certain evidence, of which the following piece must suffice as a sample owing to limitations in the length of this article: In a draft of a letter written with erasures and corrections to Joseph Hewes by Jones in April, 1776, there occurs with a few verbal changes, the eighth paragraph of the document "on personnel," dated September 14, 1775. Now the paragraph in the

[8] The names of the owners of the *Black Prince* are given in the Pennsylvania Magazine of History and Biography, Volume XXVIII, page 495.

document follows in several instances the erasures and corrections of the paragraph in the letter. This fact is not easily explained unless the document was written subsequently to the letter, and not seven months before it (Buell, I, 33; letter with erasures and corrections found in John Paul Jones' Manuscript, Library of Congress; letter in corrected form found in J. H. Sherburne's John Paul Jones, ed. 1851, 13).

The foot-note which ends the chapter under criticism is a side-light of fiction, in which few rays of historic truth appear. The following illustration, wholly typical, will suffice: This note, in describing certain short guns used in the Revolution, informs us that they were the "precursors of the 'carronade' invented about twenty years later. They were then known as 'Swedish guns' from their origin in that country" (Buell, I, p. 43). Carronades were invented by General Robert Melville in 1779, and were first cast in the iron works of the Carron Company on the banks of the Carron River in Scotland; and on January 9, 1781, such guns were to be found on 429 vessels of the British Navy (Clowes, Royal Navy, III, 330-333). It would serve no useful purpose to point out further the inaccuracies of this chapter.

Before closing this criticism, a word should be said with reference to the title of the work under discussion, "Paul Jones, Founder of the American Navy." There may be good reasons for leaving off the "J." or "John" in Jones' name. It is, however, something Jones himself did not do oftener than once in more than one hundred signatures to be found in the Jones Manuscripts in the Library of Congress. In his will he dictated his name, "John Paul Jones." But there is more fault than this to be found with the title, "Paul Jones, Founder of the American Navy." No one man founded our navy. Its establishment was a composite work, in which John Adams, Stephen Hopkins, Robert Morris, Joseph Hewes, John Hancock, John Paul Jones, Esek Hopkins and many others participated.

Favorable reviews of Mr. Buell's book will be found in the *American Historical Review*, Volume VI, pages 589-590, and in the *Nation*, Volume LXXII, pages 180-181. The *Virginia Magazine of History and Biography*, Volume VIII, pages 442-445, contains an unfavorable notice.

DISCUSSION.

The Naval Strategy of the Russo-Japanese War.

(HONORABLE MENTION.)

LIEUTENANT R. E. POPE, U. S. NAVY.—These variations of the author's ideas occur as I read his article: Russia secured an ice-free port and was about to grasp the wealth of Manchuria and Corea. So far her peace strategy had gained for her that which she wished; now she over-reached and underestimated the rival power, though warned by the minister at Tokio.

The military advisers of the Czar, accustomed to rule with an iron hand, to force from China anything they desired, treated Japan as a second China, considered Port Arthur as impregnable, and the Russian fleet concentrated there able to defeat any war vessels which Japan could bring together. "Did not two Chinese battleships fight a drawn battle with the Japanese fleet only nine years ago, and have we not always bested the Chinese?"

The efficiency of the Japanese troops with the Pekin Relief Expedition had evidently made little impression upon the government at St. Petersburg. During the negotiations prior to the outbreak of war, it was evident that the Russians placed too low an estimate upon the power and determination of the Japanese people. *This was their first and greatest error.*

I think that Admiral Makaroff knew the importance of the command of the sea, also, most of his officers certainly realized its advantages. Here is what one of them said early in the war: "The issue of the naval campaign was practically determined by the fatal night attack of February 8, with which the Japanese opened the war. When it became known on the morning of February 9 that two of the finest battleships of the fleet, the flagship, the American built *Retvizan*, and the cruiser *Pallada* had been put out of commission for several months to come by torpedoes, we realized that Japan with her six battleships and eight armored cruisers possessed a numerical and actual superiority in ships of the first line of battle which insured to her, right at the very outset of the war, the invaluable advantage conferred by the possession of the command of the sea." Again he says, speaking of the battle of August 10: "If Admiral Vithoft could reach Vladivostok he could wait in safety the arrival of the Second Pacific Squadron, and, joining forces with Rojestvensky, upon the arrival of the latter, crush the Japanese in one great sea fight and win the command of the sea."

As the author says, "A defensive campaign should have used Vladivos-

tok as a base." But, prior to the first blow, the Russians had not for a moment considered a defensive campaign. Their supposedly superior fleet was stationed on the line between Japan and Manchuria from which point they expected to control the situation. The Russian negotiators were then in Japan with more battleships in Japan's front yard than that state possessed. Possibly this nearness of the fleet added weight to their arguments.

When war broke out the Russians soon realized the advantage Japan had, and did all in their power to transfer their fleet to Vladivostok. Had not Vithoft been killed or had his second in command been able to take responsibility, the course of the contest might have been different from this date.

The point I wish to make is this: At the beginning, the Russian main fleet was properly placed for an offensive war conflict. When forced to take the defensive they again selected the proper base, but lost only because of failure to follow a compass course to Vladivostok.

These three caused the Russians to lose at sea: (1) Underestimation of their enemy; (2) poor gunnery; (3) lack of experience of their officers. All are errors of peace strategy.

One can hardly blame General Kuropatkin for saying "The navy is of little utility." At the close of the war the naval officers might have replied to this criticism with some similar remark concerning the army.

General Kuropatkin may have been nominally in command of the joint land and naval forces. The orders to the admiral in command of the fleet came from St. Petersburg; in other words, the Council of the Empire managed the army and the navy from the seat of government just as we did in 1898.

The author speaks of ours as a "Press-ridden country always clamoring," etc.; also: "Naval officers must not overlook their duty in influencing, as may be in their power, both politics and diplomacy where they affect the preparedness for war of the navy."

The Navy Department is alive to this, but for politic reasons issues no instructions to officers. We go to Congress for extra guns or for more ships—Representative Jones, before voting for four battleships instead of one, considers his constituency in district No. X. Right here we may make sagacious use of the press; though I doubt that we are using all the more simple methods of educating these constituencies: Recruiting parties throughout the country, Navy Department exhibits at all expositions, new regulations added each year to make service in the navy more popular, at the Naval Academy a little book on Strategy by Commander C. B. Brittain, is giving good ideas to 150 young midshipmen each year; most important of all are the 700 or 800 men on each ship—if each naval officer will take the trouble to be a diplomat, the American public including the press which always wants news will think as we do and assist us in our peace strategy.

Duelling in the Old Navy.

(SEE No. 132.)

The following extract from a letter written by Mr. William Gordon McCabe, of Richmond, Va., to the New York *Sun*, apropos of Mr. Paullin's account of the duel between Passed Midshipman J. P. Jones and Mr. James Hope, throws an interesting light upon the subject:

"The Mr. James Hope, a civilian, was James Barron Hope, at the time of the duel a youngster of 22, who afterward became a conspicuous figure in Virginia as poet, man of letters and editor, and who died universally lamented in 1887. His mother was Jane Barron, daughter of Commodore James Barron, and he was named for his grandfather, whose pistol he used in his duel with Midshipman Jones.

"Though a 'civilian,' Hope belonged to what used to be known as 'a navy family,' having many close kinsmen in the old navy (among others Captain Sam Barron of Tripoli fame, and the younger Captain Sam Barron, who resigned in 1861 and did good service in the Confederate Navy), and when he fought this duel he had recently returned from a cruise in the old *Cyane*, on which ship he had served as secretary to Captain Payne. Captains (afterwards Commodores) Blake and Prendergast, U. S. N., were also his uncles by marriage.

"Hope's antagonist, John Pembroke Jones (always known as Pembroke Jones), who afterward became a distinguished officer in the Confederate Navy, Flag Lieutenant to Commodore Tatnall when the latter assumed command of the *Virginia* (*Merrimac*) after Admiral Buchanan had to be relieved because of wounds received in the fight with the *Monitor*, is still living (now a resident of California), and is the oldest surviving graduate of the Naval Academy.

"The duel caused the most tremendous excitement all through Tidewater Virginia, and especially in the historic little town of Hampton, the native place of many Hopes, Barrons and Joneses. The original quarrel was between Pembroke Jones's brother Booker and Hope and dated back several years, when the last two were students at William and Mary College.

"Hope, on his return from his cruise in the *Cyane*, heard (of course through what Sir Fretful Plagiary calls some 'damned good-natured friend') that Booker Jones had been making disparaging remarks about him previous to Booker Jones's departure for California and denounced him in bitter terms. Pembroke Jones, who happened to be at home on leave, heard of Hope's caustic remarks and at once challenged him. Hope graciously replied that he 'had no quarrel with Midshipman Jones, whom he highly respected,' and suggested that the whole matter be postponed until the arrival of the brother from California, which would be in a few weeks, when he should instantly demand a full apology or 'the satisfaction usual among gentlemen.'

"Jones's second, whom I remember perfectly, in some unaccountable fashion took up the idea that Hope was 'crawfishing' and without con-

sulting Jones decided to press matters and secure a little glory for his man. He speedily found out that he had made the mistake of his life. Hope read between the lines of his reply to his suggestion what was passing through his mind and sent an answer to that reply that made a hostile meeting inevitable. Jones's second, now recognizing his stupid blunder, made effort after effort to effect an honorable arrangement, but Hope, in his natural indignation, turned a deaf ear to all his overtures. But it is certain that he would never have fired at Jones had he been fully informed of all the circumstances. They fought at ten paces and both fell desperately and it was supposed mortally wounded. Hope, while both lay in agony on the field, sent his second at once to his antagonist 'with his compliments and trusted that he was not seriously hurt.'

"They became great friends afterward and were both regular attendants of 'old St. John's' Episcopal Church in Hampton, of which my father was many years rector. I constantly saw both of them in our home, and after I grew to manhood was honored with Hope's intimate friendship until his death. He believed until his dying day absolutely in the *code duello*, but was one of the gentlest, most genial and most amiable men I have ever known.

"Everybody loved him, for he had the tender heart and open hand, and became a sort of arbiter in 'affairs of honor,' and I feel sure prevented by his tact and authority more hostile encounters than any other man of his time in Virginia.

"The fact is that in the first fifty years of the nineteenth century the young bucks of the 'Old Navy' fought about anything or nothing. Lieutenant Bushrod Washington Hunter, a great-great-nephew of George Washington, who served under my uncle, William Gordon, as a midshipman, told me that before he reached the rank of lieutenant he had been principal or second in twenty-two duels.

"I come of a navy family myself on my mother's side, nearly every one of my Gordon kinsmen having been officers in the service.

"One of my great-uncles, Captain Alexander Gordon, had the misfortune to kill in his first duel a shipmate whom he greatly loved, but who had forced the fighting, and after that seemed to wish to throw his life away, for he fought six other duels and came to be regarded as a dangerous man. On the other hand, Alexander's brother, another great-uncle, for whom I am named, Captain William Lewis Gordon, U. S. N., to whom Virginia voted a sword of honor for his splendid gallantry as a young officer under Hull in 1812, set his face sternly against duelling, and before he sailed out of Norfolk, Va., on his first and last voyage as captain, called together his wardroom officers, as one of them told me, and said simply: 'I'll have no fighting in my ship, young gentlemen. Better leave your duelling pistols ashore, for if there's any fighting among you there'll be no shore leave for you during the three years we shall be gone.' Of course he didn't object to their fighting French or English officers if these last showed any discourtesy to them or the service, and he himself, as a very young lieutenant, fought two duels at Gibraltar with English officers; but

he always said in his gentle way that 'there was nothing personal in it; I thought that the honor of the service required it and it made these gentlemen more careful in their remarks.'

"I may add that I have read Commodore Barron's account (in manuscript) of the trouble between Decatur and himself and of the events leading up to that fatal encounter. It is temperately written and amply confirmed by original letters appended to it from officers of high repute. This manuscript, in Barron's own hand-writing, is still in existence and in the keeping of his great-granddaughter, Mrs. Jane Barron Hope Marr, daughter of James Barron Hope, who fought Jones, and wife of Professor Marr, of the Virginia Polytechnic Institute, Blacksburg, Va.

"It differs widely from the commonly accepted versions of the lamentable affair and shows that Barron had suffered the most intolerable provocation before deciding to send his challenge. Captain Pembroke Jones, whom I have not seen for many, many years, a man as lovable as he is modest and resolute, has a son, Pembroke Jones, now living in New York."

PROFESSIONAL NOTES.

Prepared by Professor PHILIP R. ALGER, U. S. Navy.

SHIPS OF WAR, BUDGETS AND PERSONNEL.

ARGENTINE REPUBLIC.

The Argentine Government has ordered two battleships of the *Dreadnought* type, to be built in the United States. Both ships are to be built from plans submitted by the Fore River Shipbuilding Company, Quincy, Mass. Only one of the ships will be built by the Fore River Company, however, since it is stipulated that not more than one vessel shall be built in the same yard. The other vessel will be built by the New York Shipbuilding Company, Camden, N. J., and the machinery for both will probably be built by the Fore River Shipbuilding Company. The armor and ordnance for the ships will be supplied by the Bethlehem Steel Company.

The Argentine Government has ordered the construction of 12 torpedo-boat destroyers of 900 tons displacement, with turbine engines. They will be required to maintain a speed of 32 knots during a six hours' trial and of 35 knots under forced draft, and to steam 3700 miles. Each boat will be armed with four guns and three torpedo-tubes. Four will be built in French, four in British and four in German yards. They are to be delivered in 12 to 14 months. The Government also contemplates the construction of 12 further destroyers.—*Army and Navy Gazette.*

AUSTRIA.

VESSELS BUILDING.

Name.	Displacement.	Where Building.	Remarks.
Battleships.			
Radetsky	14,500	Trieste.	Launched July 3, 1909.
Zrinyi	14,500	"	Building.
Erzherzog Franz Ferdinand.	14,500	"	Launched Sept. 30, 1908.
Scout.			
Admiral Spaun	3,500	Pola.	Launched Oct. 30, 1909.

The battleship *Zrinyi*, the third of the new Austro-Hungarian heavy battleships, will be launched from the yards of the Stabilimento Tecnico on the 12th of April. The *Erzherzog Franz Ferdinand* will make her trial trip at the beginning of March, and is expected to be ready in May to join the summer squadron. The *Radetzky* will be placed in service at the end of the year, and the *Zrinyi* about the middle of next year, so that by the summer of 1911 the whole of the new heavy battleship division should be in service.—*The Engineer.*

BRAZIL.

VESSELS BUILDING.

Name.	Displacement.	Where Building.	Remarks.
Battleships.			
Rio de Janeiro	19,250	Elswick.	Building.
Sao Paulo	19,250	Vickers.	Launched April 19, 1909.
Scouts.			
Bahia	3,500	Elswick.	Under trial.
Rio Grande	3,500	"	" "

The *Bahia* and *Rio Grande* have completed very successful trials and will shortly leave for Brazil. The *Minas Geraes* has started for Brazil via the United States; on her final trials this vessel made 21.43 knots on 27,212 horse-power.

The official trial of the torpedo-boat destroyer *Santa Catharina*, built for the Brazilian Government by Yarrow & Co., took place on the Skelmorlie deep-water measured mile, when the contract speed of 27 knots during a continuous run of three hours, carrying a load of 100 tons, was easily exceeded.

The *Santa Catharina* is the eighth of the 10 destroyers ordered by the Brazilian Government from Messrs. Yarrow. The first six vessels are now in commission in Brazil, the seventh will leave Glasgow shortly, and the ninth and tenth are ready for launching. The dimensions of these Brazilian destroyers are: Length 240 feet, beam 23 feet 6 inches. They are propelled by two sets of 4-cylinder reciprocating engines of 8000 horse-power, collectively balanced on the Yarrow, Schlick & Tweedy system, steam being supplied by two double-ended Yarrow boilers of the latest type. —*The Engineer.*

FRANCE.

VESSELS BUILDING.

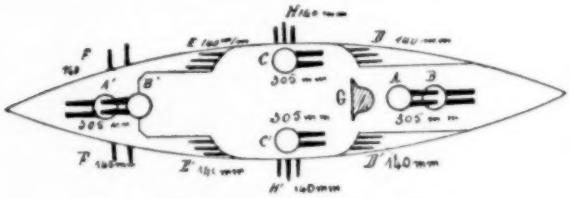
Name.	Displacement.	Where Building.	Remarks.
Battleships.			
Danton	18,350	Brest.	Launched July 4, 1909.
Mirabeau	18,350	Lorient.	" Oct. 28, 1909.
Voltaire	18,350	Bordeaux.	" Jan. 16, 1909.
Diderot	18,350	St. Nazaire.	" Apr. 19, 1909.
Condorcet	18,350	"	" Apr. 20, 1909.
Vergniaud	18,350	La Seyne.	Building.
Armored Cruisers.			
Edgard Quinet	13,644	Brest.	Launched Sept. 21, 1907.
Waldeck-Rousseau	13,644	Lorient.	" Mar. 4, 1908.

The French Navy Estimates have increased from £13,353,705 in 1909 to the intended expenditure of £14,859,034 for 1910. The increase of £1,505,329 is principally for the *personnel*, owing to the reconstitution of the fleet, and for new construction (£461,721) and ordnance (£711,997). Mr. Henri Michel, the reporter of the budget committee, states that he and his colleagues are prepared to sanction all the credits demanded. They will not stand in the way of the calls for national defence, particularly in the matter of guns, though he does not think that all the money demanded on that head will be expended in 1910. M. Michel has confined himself to a more modest rôle than some of his predecessors, and confines himself chiefly to financial considerations. Among other things he draws attention to the inadequate pay of officers, as compared with that of their comrades of the land service, who are just receiving an increase in the subaltern ranks. The main features of the proposed ships have been approved—23,000 tons, ten 12-inch and eighteen 5.5-inch guns, and turbine engines. Two ships of the class are proposed to be laid down at the end of 1910, and another at the beginning of 1911. Cherbourg, Rochefort and Toulon are intended to be specialized for the building of torpedo-craft, and the big ships to be built at Brest and Lorient.—*Army and Navy Gazette.*

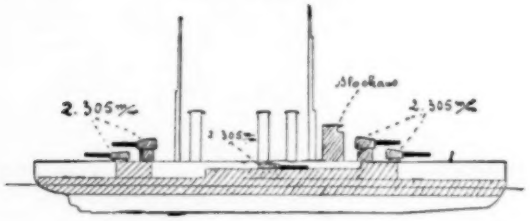
The new 23,000-ton battleships have the following characteristics, according to *La Vie Maritime:* Length between perpendicular 165 m.; maximum beam at water-line 27 m.; maximum draft aft 9 m.; displacement 23,467 metric tons. Armament: Twelve 12-inch in six turrets, four on the middle line and one on each beam; twenty-two 5.5-inch (new model) in two armored casemates; four 47 mm. on the forward bridge; four under-

water torpedo-tubes, one forward and one aft on each side. Freeboard forward about 7 m. Height of 12-inch guns from 11.5 m. for the forward pair to 6.5 m. for the aftermost pair. Height of 5.5-inch guns 5.8 m. average for 18 central guns, 3.6 m. for four after guns. The 12-inch projectiles are 4 calibers long and weigh 970 pounds; those of 5.5-inch caliber weigh 81 pounds. The turrets are of English model, central loading. Designed horse-power 28,000; speed 20 knots; turbine machinery; large tube boilers; coal at normal displacement 900 tons; full bunkers 2700 tons; three smoke-stacks instead of five, as on the *Danton*. Magazines refrigerated. Ten 90-cm. projectors. Conning-tower of new design, containing range-finding and indicating instruments, a compartment for fire-control officer and compartments for the admiral and his staff and for the captain and his assistants. A complete main armor belt 27 cm. thick at the middle and 18 cm. thick at the ends, extending 2.35 m. above and 2.50 m. below the normal water-line; below it another belt 18 cm. thick protecting the bases of the turrets and stocks. Two armored decks, one 48 mm. and the other 70 mm. thick. The 5.5-inch guns behind 18 cm. armor. The conning-tower 12 inches thick on front and sides.

THE 23,000-TON BATTLESHIPS.



AA', BB' 12" turrets having an arc of fire of 270°.
CC', 12" turrets having an arc of fire of 180°.
DD', EE', FF', HH' 5".5 guns in turrets having an arc of fire of 120°.
G Conning tower.



NEW DISTRIBUTION OF SUBMARINES.—The Minister of Marine has made a new distribution of the submarines, and their stations in future will be as follows:

Calais.—One group (offensive): *Germinal, Ventôse, Pluviôse.*

Cherbourg.—Two groups (offensive): *Floréal, Prairal, Messidor, Rubis. Emeraude, Opale* (shortly to be replaced by the *Archiméde*). One group (defensive): *Phogue, Naïde, Ludion, Méduse.* Spare submarine: *Francais.*

Brest.—One group (offensive): *Watt, Cugnot, Fresnel.* One group (defensive): *Triton, Silure, Espadon, Siréne.* Spare submarine: *Aigrette.*

Toulon.—One group (offensive): *Monge, Topaze, Saphir, Cigogne.* One group defensive, namely, five submarines of 70 tons.

Bizerta.—One group (defensive): *Papin, Circé, Calypso.* One group (defensive): *Korrigan, Gnome, Follet,* plus two submarines of 700 tons.

Oran.—One group (offensive): Three submarines of the *Fructidor* class.

The remaining submarines will be placed in the category "on trial" or in "reserve."

This new disposition creates two new groups of submarines, first at Brest, at the entrance to the Channel, second at Oran in the narrow part of the Mediterranean Sea.—*Le Temps and La Vie Maritime.*

The prize-firing returns of the French fleet for 1909 show that the best ships was the *Démocratic*, with 38 hits in 67 rounds (56.7 per cent), the second ship being the *Léon Gambetta* (70 hits in 163 rounds), and the third the *Gaulois* (70 hits in 190 rounds). The range for these exercises is about 7500 yards.—*United Service Magazine.*

GERMANY.

VESSELS BUILDING.

Name.	Displacement.	Where Building.	Remarks.
Battleships.			
Rheinland	18,500	Stettin (Vulkan).	Launched Sept. 24, 1908.
Posen	18,500	Kiel (Germania).	" Dec. 12, 1908.
Ost Friesland	21,000	Wilhelmshaven.	" Sept. 30, 1909.
Thüringen	21,000	Bremen (Weser Yard).	" Nov. 27, 1909.
Helgoland	21,000	Kiel (Howaldt).	" Sept. 26, 1909.
Ersatz Frithjof	22,000	Elbing (Schichau).	Building.
" Hildebrand	22,000	Kiel (Kaiserliche W.).	"
" Heimdall	22,000	Hamburg, (Vulkan).	"
Armored Cruisers.			
Von Der Tann	19,000	Hamburg (Blohm and Voss).	Launched March 20, 1909
G	22,000	Hamburg (Blohm and Voss).	Building.
H	22,000	Hamburg (Blohm and Voss).	"
Protected Cruisers.			
Kolberg	4,300	Danzig.	Under trial.
Koeln	4,500	Kiel.	Launched June 7, 1909.
Augsburg	4,500	"	" July 10, 1909.
Ersatz Falke	5,500 ?	Bremen (Weser).	Building.
" Bussard	5,500 ?	Stettin (Vulkan).	"
" Cormoran	5,500 ?		Authorized.
" Condor	5,500 ?		"

The German Navy Estimates for 1910 amount to £21,794,411, of which no less a sum than £12,927,500 is earmarked for ship-building and armaments. This includes £750,000 for submarines. The maintenance of ships in commission is costing £220,190 more this year than last; while other increases include £98,000 for fortifications and £90,632 for naval yards. The vote for submarines is a quarter of a million larger than last year. The ships to be laid down during 1910 are three battleships (*Ersatz Hagen, Ersatz Aegir* and *Ersatz Odin*), one armored cruiser (*J*), two small cruisers, twelve destroyers and a number of submarines.—*United Service Magazine.*

The *Von der Tann* is interesting from the point of view of the turbine arrangement, which consists of Parsons turbines driving four shafts. The high-pressure ahead turbines drive the wing shafts and the low-pressure turbines actuate the inner ones. The cruising turbines are in series, the high-pressure on the starboard inner shaft ahead of the low-pressure, and the intermediate pressure cruising turbine to port. High-pressure astern turbines are also fitted. The engine-rooms are divided into four by a longitudinal bulkhead and a traverse bulkhead, the latter arranged between the two turbines on each shaft, so that the exhaust pipes from the high-pressure to the low-pressure turbine pass through it. Whatever gain may be anticipated from additional safety due to greater sub-division would appear to be lost by the additional difficulty of supervising machinery in four compartments.—*The Engineer.*

The *Blücher* was commissioned on the 1st of October at Wilhelmshaven. Full details as to the results of her trials are not yet forthcoming, but it is reported that at the full-speed trials the *Blücher* attained a speed of 25.33 knots, or more than 3 knots over the contract speed. The *Blücher* has a displacement of 15,000 tons. Her armament consists of twelve 24-cm. Krupp guns in six turrets, fourteen 15-cm. guns, sixteen 8.8-cm. guns, twenty machine guns and six submerged torpedo-tubes. She carries 791 men, including officers.—*Page's Weekly.*

For the German battleships of the 1909 program, the question of the type of propelling machinery has at last been settled. The *Heimdall*, being built at the New Vulkan works, at Hamburg, will have Curtis turbines actuating triple screws, and will thus be the first triple-screw turbine-driven battleship. The sister ship, being built at Kiel dockyard, will have Parsons turbines.

An interesting departure in auxiliary machinery is being made in some of the 1909 German destroyers, which are to have turbine-driven air pumps and turbine-driven circulating pumps. Both are direct connected and the former is of the spray type evolved by the A. E. G. Company, of Berlin. In some of the larger vessels turbine-driven feed pumps are even being adopted.—*The Engineer.*

A new series of details relating to the German battleships of the *Helgoland* class has been published in Germany. The displacement is given at 22,000 tons; length 149 m.; beam 27.87 m.; draft, 8.39 m.; speed 20 knots. The armament is given as twelve 12-inch 50-caliber guns, fourteen 5.9-inch and twenty 4.1-inch. The suggested displacement of 19,000 tons for these vessels, coupled with the secondary armament of twelve 6.7-inch hitherto accepted, must all along have appeared to be a very conservative estimate. —*United Service Magazine.*

GREAT BRITAIN.

VESSELS BUILDING.

Name.	Displacement.	Where Building.	Remarks.
Battleships.			
Neptune	20,250	Portsmouth.	Launched Sept. 30, 1909.
Colossus	20,250	Scotts (Greenock).	Building.
Hercules	20,250	Palmer's (Jarrow).	"
Orion	22,500	Portsmouth.	"
Monarch, D-12	22,500	Armstrong.	Ordered.
Conqueror, D-13	22,500	Beardmore.	"
Thunderer, D-14	22,500	London (Thames Iron Works).	"
Armored Cruisers.			
Indefatigable	18,000	Devonport.	Launched Oct. 28, 1909.
Lion	26,350	"	Building.
1-6	26,350	Vickers.	Ordered.
Cruisers.			
Blanche	3,400	Pembroke.	Launched Oct. 27, 1909.
Blonde	3,500	"	Building.
B-5	3,500	"	Ordered.
Liverpool	4,800	Vickers.	Launched Oct. 30, 1909.
8 (Falmouth?)	5,000	"	Ordered.
Bristol	4,800	Brown & Co.	Launched Feb. 23, 1910.
Gloucester	4,800	Beardmore.	Launched Oct. 28, 1909.
9 (Dartmouth?)	5,000	"	Ordered.
Newcastle	4,800	Armstrong.	Launched Nov. 25, 1909.
10 (Weymouth?)	5,000	"	Ordered.
Glasgow	4,800	Fairfield.	Launched Sept. 30, 1909.
11 (Yarmouth?)	5,000	London & Glasgow Co.	Ordered.

With the completion of the trials of H. M. S. *Collingwood*, there are now seven ships of the *Dreadnought* type in commission or ready for service, together with three cruisers of the *Invincible* type. The second pair of the first batch of four German *Dreadnoughts*—*Nassau*, *Westphalia*, *Rheinland* and *Posen*—will not be ready for commissioning till May, and it will be even later before the first big cruiser, *Von der Tann*, is ready.—*The Engineer.*

The contracts for the four new contingent warships have been awarded by the Admiralty. These vessels come under the Navy Estimates of the current financial year, and their construction was authorized to be commenced on April 1, 1910, if the progress of foreign naval additions were such as to justify it. Three of the new vessels are to be similar to the *Orion*, laid down a few weeks ago at Portsmouth. These battleships will be built by Armstrong, Whitworth & Co., Limited, Newcastle-on-Tyne; William Beardmore & Co., Limited, Dalmuir; and the Thames Ironworks and Shipbuilding Co., London (conditionally). The fourth vessel is to be a cruiser of the *Lion* type, and will be built and turbined by Vickers, Sons & Maxim. The propelling machinery of the three battleships is likewise to be of the turbine type, that required for the Newcastle ship being supplied by Hawthorn, Leslie & Co., Limited; while the Dalmuir firm will supply its own turbines, and those for the Thames Ironworks will be constructed by the Wallsend Slipway and Engineering Company, Limited, Newcastle-on-Tyne.—*The Engineer.*

On December 18 the contracts were placed for the construction of the four contingent battleships of the naval program, and it is expected that the keels of some of these vessels will be laid in January. The firms whose tenders were accepted were Messrs. Vickers, Sons & Maxim, Messrs. Armstrong, Whitworth & Co., Messrs. Beardmore & Co. and the Thames Ironworks and Shipbuilding Co., of Poplar.

The battleships will be 600 feet long, as compared with the 490 feet of the *Dreadnought* and the 545 feet of the *Orion*, and they will have a beam of 88 feet, 6 feet more than the *Dreadnought* and 6 inches less than the *Orion*. The displacement will amount to 22,500 tons, and the ten 12-inch guns will be mounted on the center line of the ship. The armored belt will extend for a length of 400 feet. The vessel to be built at Barrow by the Vickers firm is to be a cruiser of similar type to the *Lion*, which was laid down last month at Barrow, and, according to a Manchester newspaper, "already it is suggested that the name of the ship should be *Unicorn*." The suggestion is an ingenious one, and *Unicorn* is certainly a name worth reviving, going back as it does to the year 1544, but it is very much to be doubted if this will be the name chosen. The turbines to be fitted in the vessel will be of 80,000 horsepower, and it may be noted that the Vickers firm also have the contract for the engines and machinery of the *Lion*. By the placing of these contracts all the work of the naval program of 1909-1910 has been disposed of, but there will be given out shortly the orders for the two Colonial *Dreadnoughts*. There will then be either under construction or authorized for the British Navy a total of 15 battleships and battle cruisers of the all-big-gun design, 12 protected cruisers of the *Boadicea* and *Bristol* classes, 40 destroyers and several submarines. It must be many years since so many warships were in hand simultaneously for the British Navy, and this in spite of the fact that the period of construction is now considerably less than what it was a decade ago.—*Army and Navy Gazette.*

The *Vanguard* has completed her trials, and returned to the works of Messrs. Vickers, Sons & Maxim to be completed for commission. On the eight hours' full-power trial the power was easily reached with the machinery running at about 330 revolutions a minute. The mean speed

attained was within a small fraction of 22 knots, or one mile an hour more than the designed speed. The economy effected by the machinery was exceptionally high. The coal consumption per shaft horse-power was about 1.6 pounds an hour.

On the 30 hours' trial at what is regarded as the continuous cruising speed the results were equally satisfactory. Again the vessel was loaded with ballast to exceed the designed displacement, but on the measured course she steamed at 19.5 knots, while the machinery showed by torsionmeter that 17,600 horse-power was being transmitted by the shafts. On this trial all the auxiliary machines were at work, and the evaporators were used to make up even more water than was unavoidably lost, so that the coal consumption represented the maximum necessary on service conditions, and yet the rate of consumption was only 1.7 pounds per shaft horse-power per hour. A trial was also made at one-fifth the total power, when the speed reached was 13.5 knots.

In the steam tests the practice was adopted of using the steam exhaust from the auxiliary engines for augmenting the steam supplied to the low-pressure turbine or for use in the evaporators. This use of the exhaust steam was dealt with in the presidential address of the engineer-in-chief of the fleet, Admiral Oram, at the recent meeting of the Junior Institution of Engineers, and the results of these special trials of the *Vanguard* showed that by such use of the auxiliary exhaust in the low-pressure turbine the steam consumption was reduced by more than 20 per cent at low power. The *Vanguard* also carried out her gun trials. Like all our recent *Dreadnought* battleships, she is fitted with a main armament of ten guns of 12-inch caliber and twenty guns of 4-inch caliber. The firing of these guns proved also the satisfactory character of the work done in the manufacture of gun-mounting machinery at the Vickers works.—*United Service Gazette.*

According to the *Portsmouth Evening News,* which is generally well informed on naval matters, this year's Naval Estimates will provide for four battleships, two armored cruisers, eight second-class cruisers, twenty-four destroyers and ten submarines. Provision will also be made for 5000 extra men. As regards this last, the number is at least 10,000 short of our requirements.

On November 25 the second-class cruiser *Newcastle* was successfully launched from the Elswick shipyard of Sir W. G. Armstrong, Whitworth & Co., Limited. The *Newcastle* is one of the group of the five vessels of the protected-cruiser type included in the naval program for 1909-1910, and she has a length of 430 feet, a breadth of 47 feet and 4800 tons displacement at load draft. The machinery is being furnished by the Wallsend Slipway and Engineering Company, Limited, and consists of turbine machinery of 22,000 horse-power, calculated to give a speed of 25 knots. Following the launching ceremony, the company of invited guests adjourned to the mould loft, where refreshments were served, and in the course of an interesting speech, Sir Andrew Noble recalled the fact that the first ship to bear the name of *Newcastle* was built at Ratcliffe in 1563, and served under Blake, taking part in two of the greatest feats of arms, the bombardment of Tunis and burning of the Corsair fleet and in the destruction of the Spanish treasure fleet at Santa Cruz, Teneriffe.

In addition to the interest attaching to the *Newcastle,* which had just been launched, on account of her being named after the city which gave her birth, there was another very exceptional, if not unique, feature in connection with the vessel and launch, which was worthy of special notice. As would have been observed, the vessel left the ways having her four funnels erected in position. The actual building of the vessel was commenced about the end of April last, and so rapid had been the progress

made, both on the hull and machinery work, that they had been enabled to place on board and fix in position before the launch the whole of the boilers, condensers, wing turbines and other auxiliary machinery, while the whole of the machinery and boiler-room bulkheads and the protective deck above the machinery and boiler compartments had been finally riveted up, completed and water-tested. Only two heavy weights—namely, the main turbines—remained to be lifted on board, and this operation was to be carried out on the following day. Thus, although the *Newcastle* was the last but one of her group to take the water, it was more than probable that at the present time she was further advanced and nearer readiness for trials than any of the other four vessels. So far as he knew, no vessel of the size or class of the *Newcastle* had hitherto been launched in such a condition, and they might, therefore, fairly claim to have established a record in her case.—*The Engineer.*

The unarmored cruiser *Blanche,* of the *Boadicea* class, was launched at Pembroke dockyard on October 27. The new vessel will, it is estimated, cost £285,000 exclusive of her armament, and although, in many respects, she will be identical with her predecessors, the *Boadicea* and the *Bellona,* she will differ from them in being fitted with only one mast, and in not being fitted with cruiser turbines. Her armament will also differ from that of the *Bellona,* which was armed with six 4.7-inch guns. (It will consist of ten 4-inch guns.) Her turbine machinery is being put in by Messrs. Hawthorn & Leslie, of Newcastle, her indicated horse-power will be 18,000 and her speed 25 knots. Her displacement will be 3350 tons, her length between perpendiculars is 385 feet and her breadth 41 feet 6 inches, whilst her draft forward will be 13 feet and aft 14 feet.—*United Service Gazette.*

The keel-plate of a new unarmored cruiser, the *Blonde,* has been laid at Pembroke dockyard. The *Blonde* is expected to be launched in May. It is stated that her extreme length will be 405 feet 6 inches, the breadth being 41 feet 6 inches, displacement 3500 tons and speed 25 knots.—*The Engineer.*

The experimental torpedo-boat destroyer *Swift* is expected to leave the builders' works at Birkenhead very shortly, when she will proceed to Portsmouth. The vessel ran a very large number of experimental trials last year and attained 35.3 knots on the official full-power trial. A curious feature of the *Swift* is the extravagant size of funnels which are fitted. The heating surface in this vessel is practically exactly the same as in the *Téméraire;* with oil fuel the *Swift* has developed practically twice the S. H. P. of the latter vessel.—*The Engineer.*

The two river-class torpedo-boat destroyers which were built by Messrs. Cammell, Laird & Co. as stock ships have now been purchased by the Admiralty and named *Stour* and *Test.* These two boats were built subsequent to the numerous other river-class vessels constructed at the same yard, and embody various minor improvements.

With the new British destroyers of 780 tons, the Admiralty has introduced a novel system of asking for torpedo-boat tenders. Hitherto, torpedo-craft have always been designed by private builders to a specification and guidance sketch, which gave unlimited scope for original designs and which encouraged experimental investigations in such craft with a natural view to ulterior commercial advantages. In the twenty boats of 1909-1910 program, the lines, scantlings and general design emanated from the Admiralty, thus relieving those builders whose experience was limited, but whose constructional facilities were consider-

able, of the most difficult portion of the contract. As a result the prices at which the boats were placed were considerably reduced, and at least two firms new to this class of work enter into competition with builders who have made a special study of the problems involved. There is no doubt—and quite rightly too—that the Admiralty have been at some pains to embody in the new designs the best features of the earlier boats and stability, sea-keeping qualities, strength of hull and ease of propulsion have received special attention. The vessels are rather fuller than has generally been the case before; their dimensions are 240 feet by 25 feet. Oil fuel is to be reintroduced.—*The Engineer.*

The Admiralty have decided to station small flotillas of torpedo-boats at Queenstown and Pembroke, and it is probable that as new destroyers are passed into service in the active flotillas, additional ports will be thus guarded. This is an important step, as commissioned boats, except for an occasional guardship, have never been placed at any but the three principal naval ports. It is understood that Portsmouth, Devonport and the Nore will each be defended by a flotilla of twelve boats of the coastal destroyer type, which will be fully manned. This will absorb the whole of these boats. At Pembroke and Queenstown a dozen of the older boats will be stationed. These will be manned with two-fifths or three-fifths of their full crews, but in other respects will be maintained in a state of complete efficiency.—*United Service Gazette.*

A new system of funnel-marking has been adopted for the British Navy. In future, regardless of whether they are flagships or not, ships will carry funnel-marking—not by the old system of seniority, but purely and simply following their alphabetical order in their classes. Thus, for example, in the *Bellerophon* class, the nameship, whether a flagship or not, will always have unmarked funnels. The *Superb* will carry one band, and the *Téméraire*, on the principle that T comes after S, will carry two. This is a far more sensible arrangement than the old one.—*The Engineer.*

The armored cruiser *Minotaur*, which is being sent as flagship to the China station, has had her funnels lengthened preparatory to going. She is the last of her class to be so treated, the others having been through this process about a year ago. The appearance of the ship is somewhat improved by the alteration, while comfort and efficiency are certainly doubled.

In view of the lessons of the past it is curious that short-funnelled ships should ever have been reintroduced. The theory that short-funnelled ships form a smaller target is magnificent to the last degree. In practice, however, short uptakes belch smoke and flame on everybody. In such conditions the conning of a ship becomes a matter of very serious difficulty. It must now be nearly thirty years ago that this fact was definitely ascertained; and yet we have just witnessed a repetition of the experiment in defiance of past experience.—*The Engineer.*

The division of submarines which is to be permanently stationed at the Dundee base has arrived at the northern port, after carrying out a record voyage. The flotilla consisted of ten submarines of the *C* class, and was escorted by the parent-ship *Vulcan*, the scout *Forward* and the destroyer *Wizard*. They left Portsmouth on Saturday, the 27th ult., at two in the afternoon, and arrived at Dundee at 10 o'clock on the following Monday night, having covered the entire distance of 512 miles in 56 hours. The average speed was 9.8 knots per hour. The vessels were in cruising trim, and although the sea was very rough they behaved remarkably well. It was intended that flotilla should have made a non-stop run, but *C 28* broke down, and there was a delay of an hour-and-a-half while the artisans of the parent-ship *Vulcan* made good the defect, after which the voyage was

resumed. Off Yarmouth the submarine *C 19* joined the flotilla. This long voyage in a rough sea is considered a particularly satisfactory feat, as it shows that the submarines may be relied upon for facing the rough weather to which the East Coast is so liable.—*United Service Gazette.*

The duration of courses of instruction for senior officers will in future be as follows:

Gunnery and torpedo, four weeks each; signals, three weeks; and war course, fifteen weeks.

The gunnery and torpedo courses will run concurrently with the signal and war courses, the dates being approximately as follows: Signals, spring course, February 11 to March 3; autumn course, August 18 to September 8. War, spring course, March 4 to June 23, allowing for seven days for Easter leave; autumn course, September 9 to December 22. Gunnery and torpedo, spring course, February to April; autumn course, September to November.

The new arrangements will come into force next year.—*United Service Gazette.*

THE NEW SCOUT CRUISERS.—The launch, on November 25, of H. M. S. *Newcastle* brings the number of the new scout cruisers of the city class now afloat to four. The first launched was the *Glasgow;* the second, the *Gloucester;* the third, the *Liverpool;* and the fourth, the *Newcastle.* The fifth vessel ordered is the *Bristol,* which differs from the others in having Curtis, instead of Parsons, turbines; and, with characteristic caution, Messrs. John Brown & Co., Limited, Clydebank, the contractors for this ship, undertook an exhaustive series of tests with a new Curtis turbine installation before settling upon the details of design, so that if delay in delivery is involved, the resultant higher efficiency of the machinery will compensate for the postponement of the completion of the ship. This explanation is, in a measure, justified, as there is such a keen rivalry among the firms. The order of launching does not necessarily indicate the relative state of progress in construction.

All five ships are alike, excepting for the differences due to the machinery adopted, and have been built to the designs of Sir Philip Watts, K. C. B., the Director of Naval Construction, and to Admiralty specification. The principal dimensions are: Length between perpendiculars, 430 feet; breadth, extreme, 47 feet; mean draft, 15 feet 3 inches, with a corresponding displacement of about 4800 tons. It is anticipated that a speed of about 25 knots will be obtained on trial with a shaft horse-power of about 22,000. The armament consists of two 6-inch breech-loading guns, one of which is placed on the forecastle deck forward, and the other on the upper deck aft; ten 4-inch breech-loading guns, five on each broadside, on the upper deck amidships; two Maxim guns, which are placed on the navigating bridge, and two 18-inch submerged torpedo-tubes.

The vital parts of the vessel are protected by a nickel-steel armored deck, running all fore-and-aft, the sloping sides of which extend well below the water-line. Additional protection is provided by the coal in the bunkers, which extend along each side of the vessel for the entire length of the machinery spaces above the protective deck, and for the length of the boiler-rooms under the protective deck. The magazines and shell-rooms, from which the guns are served, are ventilated and lighted on the latest system, and kept at a low even temperature by special refrigerating plant installed for the purpose. "Ready-use magazines" with armored walls are introduced on the protective deck, having hand-up scuttles on the upper deck overhead, adjacent to, and for the rapid supply of, the 4-inch broadside guns.

The vessel is sub-divided into numerous water-tight compartments; the turbine machinery which drives the four propeller-shafts is contained in

three separate engine-rooms, with two additional compartments for the main condensers, while the twelve water-tube boilers are placed in three separate boiler-rooms. The double bottom which extends under the machinery spaces and the forward magazines is also sub-divided into numerous compartments which are used for carrying oil-fuel and reserve feed-water for the boilers.

The vessel has four funnels and two masts, as shown in the view of the *Newcastle*. The masts are square-rigged, suitably stayed, and arranged to take the gear in connection with the wireless-telegraphy installation and signalling apparatus, etc. A platform will be fitted on the fore lower mast, from which the firing of the several guns will be electrically directed. A long raised forecastle is built on the upper deck forward, and the navigating bridge and compass platforms are fitted over the after end of the forecastle deck. Two powerful searchlights will be placed on the navigating bridge and the lower conning-tower on the platform deck, an armored tube placing them in communication with one another.

A steam-driven capstan gear for dealing with the anchors is placed on the fore end of the forecastle deck, and an electrically-driven warping-capstan on the upper deck aft. Two electric coal-hoists will be fitted on the upper deck amidships, arranged for rapid coaling. The heavier ship's boats will be placed under davits and supported on skid beams, and the lighter boats will be hung under davits over the upper deck amidships. The ship's galleys, bakery and the refrigerating-machinery-room, etc., are to be placed in deck-houses in the casings on the upper deck amidships.

Accommodation for the captain and chief officers of the ship will be provided on the upper deck forward, inside the forecastle, and for the warrant officers, etc., on the protective deck forward, while the crew's quarters, with their wash-places, etc., will be placed on the protective deck aft.

Complete systems of electric lighting, ventilation and steam heating are arranged throughout the ship, and provision is made whereby the fresh air delivered to the living spaces can be heated if required.

As we have said, the propelling machinery of four of the vessels is of the Parsons turbine type, of 22,000 shaft horse-power, having four lines of shafting arranged in three separate engine-rooms. The high-pressure ahead and separate high-pressure astern turbines are arranged on one shaft in each wing compartment. One low-pressure ahead turbine (in which is embodied the low-pressure astern turbine) is mounted on each of the inside shafts, being placed in a center compartment, which also contains the maneuvering gear for all the turbines. There are no separate cruising turbines, a special series of blades for cruising purposes being fitted in each high-pressure turbine. The propellers, four in number, of bronze, are arranged to run outward. At the aft end of the engine-rooms, and separated from them by a watertight bulkhead, there are two auxiliary machinery-rooms, a center line bulkhead dividing the one from the other. The main condensers, which are two in number, are arranged in these compartments, which contain also air-pumps, circulating-pumps, feed-water filters, evaporating and distilling plant, etc.

The boilers, twelve in number, of the small-tube type, are arranged in three separate boiler-rooms, and in each boiler-room there will be one main and one auxiliary feed-pump. The boiler-rooms are adapted for use with the closed stokehold system of forced draft, the supply of air being provided by steam-driven fans. Oil-pumps are provided for both oil fuel and forced lubrication purposes.

Under this year's program four other vessels of the same class have been ordered: one each from Sir W. G. Armstrong, Whitworth & Co., Limited, Messrs. Vickers, Sons & Maxim, Limited, Messrs. William Beardmore & Co., Limited and the London and Glasgow Shipbuilding Company, the last to be fitted with Curtis turbines by Messrs. John Brown & Co., Limited.—*The Engineer.*

ITALY.

VESSELS BUILDING.

Name.	Displacement.	Where Building.	Remarks.
Battleships.			
Dante Alighieri	19,000	Gov't Yard, Castellamare.	Building.
Cavour.	22,000	" " Spezia.	"
Giulio Cesare	22,000	Ansaldo-Armstrong.	Ordered.
Leonardo da Vinci ...	22,000	Genoa (Odero).	"
Armored Cruisers.			
San Giorgio.....	9,800	Gov't Yard, Castellamare.	Under trial.
San Marco	9,800	" "	Launched Dec. 22, 1908.
B.....	9,800	Leghorn (Orlando.)	Building.
Scouts.			
Quarto.....	3,600	Venice.	Ordered.
Vesuvio	3,600	.....	"
Marsala	3,600	Castellamare.	"
Nino Bixio.....	3,600	"	"

The various statements that have been made with regard to the Italian shipbuilding program make it desirable to give the facts so far as they are known. The *Dante Alighieri*, which was laid down at Castellamare in June, is to displace 19,000 tons, and to have an armament of twelve 12-inch guns, eighteen 4.7-inch and some smaller. New plans have been prepared, but this ship will not be affected by them. Three other ships are intended, of which one will be built at Spezia, and the others in private yards, probably in those of the Odero firm at Foce, near Genoa, and the Ansaldo-Armstrong Company at Sestri Ponente. These ships are to be of about 22,000 tons, and to be named *Conte Cavour, Giulio Cesare* and *Leonardo da Vinci*. The large building berth at Spezia was lengthened sufficiently for the building of the *Roma*, and any one of the new ships can be laid down there without much delay, but at the private yards the lengthening of slips will be necessary, and the ships cannot be laid down until the autumn. The statement that Signor Michaeli, who designed the *Benedetto Brin* and the four cruisers of the *Amalfi* class, has prepared plans for a battleship of 32,000 tons armed with sixteen 15.7-inch guns, will naturally be received with great reserve if not incredulity. The present intention is to arm the new ships with twelve 12-inch guns possibly placed in four turrets, but on the latter point nothing is known. The financial part of the program will, it is said, cover the period up to 1916, and will provide also for four scout-cruisers of 3600 tons and 26 knots, to be named *Quarto, Vesuvio, Marsala* and *Nino Bixio*, as well as 12 destroyers of 600 tons, 50 torpedo-boats, 12 submarines and a dock and mother slip for the latter.—*Army and Navy Gazette.*

The *Napoli*, at her three hours' full-speed trial, made an average of 22.5 knots, with the engines developing 19,700 I. H. P., and making 122 revolutions; she has a displacement of 12,500 tons, and steam is provided by 22 Babcock and Willcox water-tube boilers. The *Roma* has also completed her trials successfully; at her three hours' full-speed trial she averaged 22 knots, with her engines developing 21,000 I. H. P., steam being supplied by 18 Babcock and Willcox water-tube boilers.

The armored cruiser *Pisa* has also completed her trials; at her three hours' forced-draft trial she averaged a speed of 23.5 knots, with the engines developing 20,812 I. H. P. and a coal consumption of 1 pound 10 ounces per indicated horse-power per hour, and during a six hours' run she maintained a speed of 23.5 knots, or nearly 2 knots over the contract. She is provided with 22 Belleville water-tube boilers.

A sister-ship of the *Pisa*, the *Amalfi*, has also completed her trials; at her three hours' full-speed run with the engines developing 20,812 I. H. P. and a coal consumption of 1 pound 10 ounces per indicated horse-power

per hour she maintained a speed of 23.64 knots. At her economical coal consumption trial with eight boilers alight, the engines developing 2447 I. H. P., and making 65 revolutions, she maintained a speed of 11 knots with a coal consumption of 1 pound 9½ ounces per indicated horse-power per hour, and a total consumption of 2 tons 400 pounds; she has thus a steaming radius of 11,000 miles at 10 knots speed, as her total coal stowage is 2100 tons. Steam is supplied by 22 Belleville boilers.—*Marine Rundschau, Revista Marittima and Revue Maritime.*—From *United Service Institution.*

Le Yacht states that three cruisers have been ordered from the Orlando Co. at Leghorn, the Odero Co. at Genoa and the Ansaldo-Armstrong Co. at Lestri Ponenti, respectively.

The battleships *Duilio, Dandolo, Lauria* and *Doria*, together with four old cruisers are to constitute a squadron of colliers, carrying 50,000 tons of coal, according to the same authority.

The *Moniteur de la Flotte* states that the armored cruiser *B*, building at Orlando works at Leghorn, has been purchased by Greece and will be named *Averoff*.

JAPAN.

VESSELS BUILDING.

Name.	Displacement.	Where Building.	Remarks.
Battleships.			
Satsuma	19,200	Yokosuka.	Under trial.
Aki	19,800	Kure.	Launched Apr. 15, 1907.
Kawachi	20,800	"	Building.
Settsu	20,800	Yokosuka.	"
Armored Cruisers.			
Ibuki	14,600	Kure.	Under trial.
Kurama	14,600	Yokosuka.	Launched Oct. 21, 1907.
Protected Cruisers.			
1	5,000	Sasebo.	Ordered.
2	5,000	Nagasaki.	"
3	5,000	Kobe.	"

RUSSIA.

VESSELS BUILDING.

Name.	Displacement.	Where Building.	Remarks.
Battleships.			
Emperor Paul I	16,900	St. Petersburg.	Launched Sept. 7, 1907.
Andrei Pervozvannui	16,900	"	" Oct. 20, 1906.
Evstafi	12,500	Nicolaiev.	" Oct. 1906.
Ivan Zlatoust	12,500	Sevastopol.	" May 13, 1906.
Sevastopol	21,000	St. Petersburg (Baltic Wks.).	Building.
Petropavlovsk	21,000	" "	?
Poltava	21,000	" (Admiralty Yd.).	?
Gangoot	21,000	" " "	?
Armored Cruisers.			
Bayan	7,800	St. Petersburg.	Launched Aug. 15, 1907.
Pallada	7,800	"	Under trial.
Protected Cruiser.			
Outchakoff	6,750	Sevastopol.	Building.

THE PRESENT STATUS OF THE RUSSIAN NAVY.—The practical annihilation of the Russian Navy during the war with Japan led many people to believe that after a short interval of time devoted to financial recuperation the

navy, which has been tried and found so wanting, would be completely reorganized, and that an extensive program of reconstruction would be undertaken. Probably this would have been carried out with the same deliberation that characterized the growth and gradual concentration of the late fleet in the Pacific had it not been for the revolution in Russia early in 1906, and the subsequent grant of constitutional powers to the Duma, which, though much curtailed in many important directions, nevertheless exercises a wholesome supervision over matters financial. The navy that came to such utter grief in 1904 and 1905 can only be described as one solely intended for aggression, but the political conditions in Russia have changed greatly in the last few years, and, as has recently been shown, powerful neighbors are none too reluctant to take advantage of the present Russian weakness. The new navy of Russia will be built for defence and not for attack, and even in the state of chaotic disorganization in which the Ministry of Marine at present exists this fact is clearly appreciated.

During the last ten years Russia has spent, or, at least, provided for her fleet, a sum averaging just over ten million pounds a year, of which about £3,750,000 has been annually devoted to new construction. The Japanese sank at least six first-class battleships and captured others, and to-day the Russian Navy consists of only two so-called first-class battleships, the *Czarevitch* and *Slava*, each of 13,500 tons, excepting those shut up in the Black Sea and of a few cruisers, of which only the new *Rurik* is of any modern fighting value. The *Dreadnought* era has hit Russia hard. Even before the war was over the *Dreadnought* was already laid down, and coming at a period of financial stringency, nothing was actually done in the way of copying her, although just before the end of 1906, tentative orders for one ship each of this type were placed with the Baltic and new Admiralty yards; 1906 was a year of great political uncertainty for Russia, and little or nothing was done beyond launching one 16,000-ton ship in August which remains still unfinished at the Baltic yard. In 1907 a lengthy reclassification of the fleet was ordered by the Czar, and on the strength of a voluminous report on the state of the navy, several elaborate schemes of naval construction were laid before the Duma, which by this time had greatly increased in influence.

The new plans of construction were, however, entirely rejected early in that year on the ground that a comprehensive reconstruction of the fleet was impossible without a thorough reorganization of the administration and a complete investigation of the condition of the whole service was at once begun. Nevertheless, in spite of the temporary decision of the Duma not further to increase the larger vessels of the fleet, several shipbuilders were asked to supply tenders and designs for vessels exceeding 20,000 tons. Among many other matters reported on by the Defence Committees was that of the capability of the Russian yards to construct such vessels, and builders were asked to quote for ships to be built under most stringent—and some absurd—conditions in Russia. These negotiations, with repeated requests for alternative designs, were very much delayed by the system of committees in vogue at the Russian Ministry of Marine, where strong prejudices exist against the appointment of one or two men with sole power to settle important matters, and one or two firms at least who felt that these continual alternatives were made less from military needs than from a desire to acquire up-to-date information, refrained from further competition. This state of affairs continued throughout 1908, during which year only a few vessels of minor importance were added to the fleet, and no large ships of any kind were launched. The main difficulties in the way of any agreement were the refusal of the Duma to vote money for large ships, and the natural objection of the few firms who continued to submit designs to guarantee the required results unless they had control of the yard in which the ships were to be built. Early in 1909 the order placed some two years before with the Baltic works for a 21,000-ton ship actually materialized in the laying of the keel, the vessel being built to the designs

and under the supervision of John Brown & Co., Limited. A second, hitherto uncommenced, is reported as going to be laid down at the New Admiralty yard. This year the Duma has again rejected the vote for the construction of large ships, with the result that little or nothing will be done in Russia for some considerable time except in small craft.

Following the defensive policy now realized as essential, and prevented by financial reasons from building battleships, Russia has amassed a very large destroyer flotilla of a mixed type. Both during the war with Japan and in the two subsequent years numerous vessels were built at Abo, Riga or Helsingfors and engined principally by German firms, which retain a very strong connection with Russian marine circles. Most of the newer destroyers are about 560 to 600 tons with speeds of 25 to 27 knots. A few destroyers are still under construction at Nikolaiev, but even in this direction the output is being reduced.

As matters stand at present, it appears that for the next few years—ten, it is stated—the naval estimates are not to exceed £8,800,000 a year, which is the average for the last three years, but there are persistent efforts being made both by national and foreign interests to carry through the Duma one of the big schemes of naval construction suggested in 1907. In nearly all cases where attempts have been made by foreign firms in Russia to establish really efficient works the final results have been unsatisfactory. Until recently the same might have been said of Spain, but with the English syndicate of Armstrongs, Browns and Vickers at the back of the Spanish Naval Construction Company, even the national lethargy is not likely to prevail. To deal with what was expected to be a huge reconstruction program, similar syndicates both in England and Germany have been formed, and every advantage would appear to accrue by the acceptance of such assistance by Russian firms, but up till now, with the exception of the arrangement between Messrs. John Brown and the Baltic works, no community of interests has been arranged.

The latent wealth of Russia is very great indeed; it is due to no actual lack of money that the Duma has refused to sanction greater naval expenditure, but to the fact that political and administrative conditions are such that the time has not yet come. Meanwhile, the Russian Navy, as far as material is concerned, is in a state of semi-stagnation. The losses in the war were far more serious in ships than in officers and men, and the result has been that unemployment, or employment without adequate work, is very general. A training squadron, consisting of the two battleships mentioned and small cruisers, has recently been cruising continually round European ports, and a large number of the torpedo-craft is maintained in commission, but adequate training of the existing *personnel* is almost impossible to provide. The same applies to the constructive and administrative departments, whose members remain in office to attend to a quarter of their former work. The Government yards are proceeding very slowly with the work already in hand. The *Andrei Pervozvannyi*,* launched from the New Admiralty yard in October, 1906, is still far from completion, while the *Pallada*, of under 8000 tons, launched in November of the same year, is equally far behind. The *Bayan*, a sister-ship, launched in August, 1907, is in a similar condition. The *Zlatoust*, being built at Sebastopol, is not yet ready, though launched in 1906. How yards working under these conditions can construct vessels of 22,000 tons and 30,000 horse-power—that is, of nearly double the size—is hard to see, unless the control is largely given over to foreign firms who are prepared to undertake the renovation and executive management of the Russian firms. The more progressive party in the Duma have already assured, as far as they can, that Russian ships shall be built in Russia, and we have already indicated the difficulties

* The launching of this ship was described in No. 120 of the PROCEEDINGS as occurring on October 20, 1906, but through some error the date has ever since been given in the Professional Notes as October 20, 1905.—P. R. A.

that must be faced. It will be a long time before Russia can again be considered as a naval power of any importance; meanwhile, the return for the £10,000,000 a year of the naval estimates seems hopelessly inadequate.—*The Engineer.*

SPAIN.

The keel was laid at Ferrol on December 5 of the Spanish battleship *Espana*, the first of the three to be built under the decree of the Cortes of January, 1908. On a displacement of 14,760 tons the ship will carry eight 12-inch and twenty 3.9-inch guns and three torpedo-tubes. Engines of 20,000 horse-power are designed to give a speed of 19.5 knots, and protection will be afforded by a main belt 9.4 inches thick, with 7 inches on the side above the belt, the turret sides being 10 inches in thickness. There will be a maximum capacity for 2000 tons of coal.—*United Service Institution.*

UNITED STATES.

VESSELS BUILDING.

No.	Name. *Battleships.*	Speed. Knots.	Where Building.	% of Completion Feb. 1.
28	Delaware	21	Newport News.	99.5
29	North Dakota	21	Fore River.	98.6
30	Florida	20¾	Navy Yard, New York.	50.5
31	Utah	20¾	New York Shipbl'g Co.	62.2
32	Wyoming	20½	Wm. Cramp & Sons.	9.0
33	Arkansas	20½	N. Y. Shipbuilding Co.	11.8

ORDNANCE AND GUNNERY. TORPEDOES.

SHOOTING IN THE BRITISH NAVY.—We have received the three annual Blue-books entitled respectively: "Result of Test of Gunlayers with Heavy Guns," "Result of Test of Gunlayers with Light Quick-firing Guns," and "Result of Battle Practice from Torpedo Boat Destroyers," all of his Majesty's Fleet, for the year 1909.

Taking first of all the figures for heavy guns, we give below the results obtained in the years 1907, 1908 and 1909:

	1907.	1908.	1909.
Number of rounds fired	9538	9009	9438
Number of hits	4073	4826	5108
Number of misses	5465	4183	4330
Percentage of hits to rounds fired	42.70	53.57	54.12

The percentage increase of hits to rounds fired is not so great as the percentage increase shown in 1908 over 1907, but, nevertheless, it is eminently satisfactory. It will be remembered that in the year 1907 a smaller sized target was used for the first time. The actual sizes used are not given, but the comparative figures for the old and new sized targets in 1907 are set out as being 79.13 and 42.70 per cent respectively, and it is probably not overstating the case to say that were the old target still to be employed the percentage of hits to rounds fired would very nearly represent cent per cent. It is worthy of notice that ever since 1900, when the percentage of hits to rounds fired was only 32.3 with the older and larger target, the shooting of the navy with the larger guns—that is to say, from 12-inch down to 4-inch quick-firers—has, with the solitary exception of 1904, when there was a setback from 46.04 per cent to 42.86 per cent—to be followed by a jump to 56.58 per cent in 1905—shown a steady and, in some years, a really remarkable improvement. It will be of interest, perhaps, to give the actual figures for the years in question. They are:

Table showing the Percentage of Hits to Rounds Fired.

	1900.	1901.	1902.	1903.	1904.	1905.	1906.	1907.	1908.	1909.
1906 target	32.3	36.3	41.1	46.04	42.86	56.58	71.12	79.13	...	...
1907 target	...	...	...	...	...	...	...	42.70	53.57	54.12

The analysis of the hits per gun per minute show that with the 12-inch and 10-inch guns there were .63 hits in this time as an average; with the 9.2-inch guns, 1.94 hits; with the 7.5-inch guns, 2.47 hits; with the 6-inch guns, 4.03 hits; and with the 4.7-inch and 4.0-inch guns, 4.06 hits. These figures show in some cases an advance and in others a falling off as compared with the 1908 figures, but in no case do they differ very widely from the latter. The greatest difference is shown in the 4.7-inch and 4.0-inch guns, in which the figures for 1908 and 1909 were 3.32 and 4.06 hits per gun per minute respectively.

With the light quick-firing guns—12, 6 and 3-pounders—an advance in efficiency is also chronicled, as may be seen from the accompanying table:

	1907.	1908.	1909.
Number of rounds fired.....	17,734	12,943	14,276
Number of hits.....	7,462	6,120	7,157
Number of misses.....	10,272	6,823	7,119
Percentage of hits to rounds fired	42.08	47.28	50.13

There is a considerable difference in the total number of rounds fired in the three years, and this is not entirely due to the varying numbers of ships and guns taking part, for whereas 122 ships and 1898 guns were concerned in 1907, only 111 ships and 1384 guns figured in 1908. In 1909, however, still fewer ships—104—took part in the test, but 1407 guns were engaged.

As regards the numbers of hits per gun per minute, the 1909 figures show an advance over the figures of those of both 1907 and 1908, saving in the case of the 6-pounders and 3-pounders other than Vickers, where the 1909 figure is not so good as that of 1908, though considerably better than that of 1907. The comparative figures for the three years in question are given below:

	Hits per gun per minute.		
	1907.	1908.	1909.
12-pounders	4.471	5.319	6.005
6 and 3-pdrs. (except Vickers)	3.640	4.507	4.191
3-pounder Vickers	6.140	6.069	7.810

The results of battle practice from torpedo-boat destroyers had shown a very marked improvement in 1908, and there is further considerable improvement to chronicle for 1909. To show this, we think that we cannot do better than reproduce in full the table in the report, in which the results are summarized:

		1905.	1906.	1907.	1908.	1909.
Number of ships that fired.....		57	52	121	139	149
Number of guns.....		342	312	669	701	688
Number of hits.....		653	1004	2069	4066	5130
Number of misses.....		2608	1898	3709	2906	2766
Percentage of hits to rounds fired....		20.02	34.60	35.81	58.32	64.97
Hits per gun per minute	4-inch B. L....	...	...	...	...	9.00
	12-pdr., 12 cwt.	1.54	2.43	3.97	7.44	9.26
	12-pdr., 8 cwt.	...	...	...	5.41	5.96
	6-pdr.	1.98	3.73	3.57	7.12	9.83

It will be observed that not only was there an increased percentage of hits to rounds fired in 1909, but that the hits per gun per minute show an

astonishing improvement. It is interesting in this connection to compare these results with those obtained in the tests with light quick-firing guns alluded to above. Good as these latter figures are, they are very considerably exceeded by the torpedo-boat destroyers' battle practice figure, both in percentage of hits to rounds fired and in hits per gun per minute. It is interesting to note the figure attained with the 4-inch B. L. gun introduced this year for the first time into practice of this description.—*The Engineer.*

THE COMING BRITISH AUTOMATIC RIFLE.—The appointment of Brigadier-General H. H. Wilson's committee to report on the subject of the possibility of introducing a practical service automatic rifle has been accompanied by rapid action in the matter of a specification. The ground was already clear for a full investigation of the question. The defective breech action of the present rifle was well known, and, though ammunition makers have been endeavoring to produce a high-velocity cartridge suitable for use with it, which would give a trajectory as flat as that obtained with the German rifle, the task has been recognized as impossible of realization. Experiments were made with a view to the possible substitution of a stronger breech-mechanism, but Mr. Haldane admitted in the House of Commons that to make the alterations in the rifle that would be involved would necessitate the adoption of what would practically be a new weapon altogether. The need of providing a new arm was, therefore, admitted, and has, indeed, long been recognized to be imperative by soldiers who have known what was being done on the Continent with high-velocity pointed bullets, giving a flatness of trajectory that had hitherto been impossible. If, therefore, a new rifle was to be introduced, it must inevitably be an automatic. At the Small Arms Factory full consideration has been given to the difficulties of the problem, and it is understood that a design as the basis of a specification for an automatic had been laid down. We have always maintained that it would be unsound policy to entrust a matter so important as the introduction of a new type of weapon entirely to the Government experts, to whom the final selection of the intended new rifle will ultimately fall. It was necessary to utilize all the skill and ability in the matter of rifle design and construction that the country possesses, and we are glad to know that this has now been fully recognized.

The gun-making trade have been invited to submit designs and patterns of an automatic and magazine weapon suitable for use under service conditions, and to deliver them by May 1 next to the Director of Artillery, accompanied by at least 300 rounds of rimless or other ammunition to be used with the arm. The service conditions are laid down very clearly. The rifle is to be as simple, strong and compact as possible, and the mechanism is to be protected from the entrance of sand, rain or dirt, and to be free from derangement by accident, long wear and tear or rough usage and exposure to wet and sand, or to fouling from long-continued firing. Moreover, it must be capable of being easily cleaned and inspected, and of easy and cheap repair, and any parts that may require to be cleaned or oiled by the soldier must be such as can be opened up without the use of tools. Filling the rifle and loading the cartridge into the chamber are to be done with ease and certainty. These and others are, no doubt, severe conditions, but they are essential for a service weapon. With regard to ballistics the following are the qualities required: The bullet should be pointed, must weigh not less than 150 nor more than 180 grains, with a caliber of from .270 inch to .280 inch, and the height of the trajectory at a range of 800 yards must not exceed 5 feet 3 inches, while the working pressure must not be more than twenty-one tons to the square inch at 80° F. Lightness is a feature to which great importance is very properly attached, and in any case the new rifle is not to exceed 9½ pounds, without bayonet, and with magazine empty. There appears to be no stipulation as to the length of the proposed weapon.

A very wise provision is that the rifle must be capable of being used

either as a magazine rifle or as an automatic loader, and the change from the one to the other system must be made simply and rapidly.* The weapon must work efficiently as an automatic with the bayonet fixed, the attachment of the latter being to the fore end and not to the barrel. In magazine use, with a five-cartridge magazine fed by charger or clip, the bolt or block must work easily, and without excessive force being required. There must be one round for each pressure of the trigger, and when the magazine is empty there must be some conspicuous indication of the fact. Various safety requirements are laid down also. At the moment of firing the bolt or block supporting the base of the cartridge must be locked to the barrel or to some part securely attached to the barrel. It must not depend upon friction, inertia or the pressure of springs to resist separation of the breech bolt or block from the barrel on discharge. Moreover, it must be impossible to fire the rifle until the locking is complete, and an efficient safety device must be provided to prevent the rifle being fired when the device is in use, and when the latter is out of action the rifle must remain cocked and ready for firing. If these strenuous requirements can be satisfied, the army will, we think, be provided with an efficient automatic weapon. Although it was disappointing that the present short rifle was so soon out-distanced by the introduction of high-velocity pointed bullets, which could be used with foreign weapons, we shall be placed in an excellent situation if a good automatic can be put into course of manufacture next summer or autumn. The new type weapon will not be adopted until after exhaustive trials. We cannot contemplate the great outlay involved until the experts and the army are satisfied that we have the interchangeable automatic and magazine rifle we require.—*United Service Gazette.*

AUTOMATIC RIFLE.—Mexico enjoys the distinction of being the first power to adopt an automatic infantry rifle. The 1909 weapon is on the same principle as the Hotchkiss machine gun; there is a small hole in the barrel through which a portion of the powder-gases passes into a power-cylinder under the barrel, where it actuates a piston which opens the breech, ejects the empty cartridge case, inserts a fresh cartridge and closes the breech. The rifle can then be fired again by pulling the trigger; or, if the trigger be held back, the rifle will continue to fire automatically till the ten rounds in the magazine are exhausted. Like all modern rifles, the Mexican weapon fires the new pointed bullet, which has only a short cylindrical portion, the remainder being an ogival point struck with a radius of 10 diameters. These bullets will pierce a 5-mm. gun-shield at 100 yards' range.—*The Engineer.*

MACHINE GUNS.—The development of machine guns has been stimulated by the greatly increased demand for these weapons. The French are manufacturing the Puteaux machine gun on a large scale, no less than 4000 having been ordered for the army, besides those intended for the frontier defences. This weapon is an improved type of the Hotchkiss gun, which was shown at the Franco-British Exhibition. The lock has been strengthened; the radiator for cooling the barrel is now extended nearly to the muzzle, and two stout handles are fitted instead of the Hotchkiss pistol grip. The cartridges are loaded in clips, each containing 25 rounds. It is doubtful whether the French are wise in dispensing with the water-jacket, as the heating of the gun seriously affects its accuracy. One objection to the water-jacket is the visible steam which rises from it. It has been recently proposed to carry with a machine gun a water-cooler, consisting of a flat waterproof canvas bag, about a yard square, to be laid on the ground, and connected to the water-jacket by two india-rubber tubes. Circulation is to be maintained by a small force-pump connected to the breech action. The "portable" machine gun is a new weapon which is

* There are those who would characterize this as a *very absurd* provision. —P. R. A.

attracting considerable attention. It is an automatic rifle weighing about 16 pounds, and is carried and fired by one man. It is supported when firing by two props under the muzzle. These rifles are capable of firing 250 rounds a minute for a short time, or until they get too hot. A heavier pattern, with water-jacket, weighs 25 pounds. The Rexer portable machine gun, which is of the lighter type, without jacket, has been adopted by the Russian cavalry.—*The Engineer.*

A new explosive for shells, mines and torpedoes is being manufactured by the Carbonite Explosives Company, Limited, of Hamburg. It is known commercially as "Trotyl," its full name being Trinitrotoluol and its composition ($C_6H_2CH_3(NO_2)_3$). The advantages claimed for this composition over picric acid in its various forms are: (1) chemical stability; (2) lack of chemical attraction; (3) safety and innocuousness during manipulation; (4) non-hygroscopicity and absence of fire risks; and (5) insusceptibility to shock and blow. Trotyl is obtained by step-up nitration of toluol and dinitrotoluol according to known methods. In order to obtain the highest purety, the trinitro-toluol is finally distilled over and recrystallized (preferably by means of alcohol), yielding an end-product free from impurities and low-grade nitro-bodies. Its melting point is between 80.7° and 81.5° C. —*United Service Magazine.*

THE FIRINGS AGAINST THE "IENA."—The projectiles fired against the *Iena* were of the following types:

1. Steel a. p. shell loaded with black powder, such as are found in the magazines of all French fighting ships, of calibers 6.5-inch, 7.7-inch and 12-inch.
2. Steel a. p. shell of the same calibers, but in which the black powder had been replaced by melinite.
3. Steel a. p. shell of the new heavy type, 4 calibers long. 9.5-inch and 12-inch guns and loaded with melinite; 13¼ pounds for the 9.5-inch and 29 pounds for the 12-inch.
4. Semi a. p. shell, model R/2 for the 6.5-inch, 7.7-inch and 12-inch calibers. These shell are supposed to contain 6 per cent of their weight of melinite.
5. Cast-iron shell loaded with black powder.
6. A special type of shell carrying 10 per cent explosive.
7. Shell of the army type (model P and model 1891) of 9.5-inch caliber and carrying, respectively, 75 and 77 pounds of explosive.

With the exception of the army shell, all tested were specially made and loaded at Gavres. The firings took place at a distance of from 400 to 600 meters with reduced charges.

The a. p. shell loaded with black powder gave good perforation, but their bursts after penetration had very little effect. The fragments were few in number, four or five at most.

The a. p. shell loaded with melinite were fired with a new fuse, the Watson fuse. As with the others, perforation was easily obtained. The fragmentation was much more complete and quite destructive.

The heavy steel a. p. shell containing about 3 per cent of their weight of melinite (9.5-inch shell weigh 485 pounds and the 12-inch 970 pounds) gave excellent results. They perforated, always burst after perforation and their fragments destroyed everything within a certain radius of the point of burst. We are told, however, that these shell are not yet perfected. Several seem to have tumbled in flight.

The semi-armor-piercing shell seem to have justified the hopes of the marine artillerist service. They perforated more than half their caliber of armor, bursting at the proper point and producing frightful damage.

The cast-iron shell, loaded with black powder, made enormous holes in structural plating, against which they were fired.

It appears that the shell containing 10 per cent of explosive, specially manufactured for these tests, gave no such results as those described by Semenoff.

The army shell show themselves quite unsuitable for the needs of the navy. The shell P broke up upon quite thin plating. Neither did it burst after having gone through still thinner plates. The model 1891 shell, although better, is scarcely suitable for naval use.

Only in a few cases was anything set fire to on board the *Iena*. A few dogs were asphyxiated and burned on the exterior, but several went through all the firings.

These tests show conclusively that what is needed is steel shell capable of perforating armor, whether a. p. or semi a. p. They should be heavy and contain high explosive. Their present fuse, called the Gavres fuse, should be replaced by the Watson fuse, or a similar one.

The tests show that for an armor-piercing shell to produce a truly frightful effect, after perforation, it is not necessary that it contain as much explosive as many technical people have hitherto demanded.—Abstracted from *La Vie Maritime.*

THE TRIPLE-GUN TURRET.—The value attached to heavy-caliber naval ordnance continues to grow, and further improvement in fighting power is sought in one direction by increasing in number the heavy guns mounted on board battleships. As a direct consequence of this condition, naval architects have been led to consider means for reducing the weight involved in mounting and carrying the guns, and one of the solutions to which they have given their attention has been the adoption of turrets containing three large-caliber guns instead of two only. According to information current some time ago, the German Navy was to be the first to take in hand the new departure; this, however, has since proved to be inaccurate. The same question has also been considered in detail by Italy, then by Russia, and in the latter country it appears to have been favorably reported upon. The French Navy proposed the adoption of the triple-gun turret in a program for the battleships to follow the *Danton* class, but the scheme, according to information of very recent date, does not appear to have survived the late change in the French Ministry, and it may not finally be adopted. The question of mounting triple-gun turrets on battleships being one which is occupying the minds of naval experts, it is worth looking into.

The increase in the number of pieces of ordnance on board battleships has been rendered more difficult than it otherwise would have been by the adoption of the all-big-gun principle. This principle was accepted by the United States in the design of the *Michigan*, which is that country's embodiment of the *Dreadnought* type; and the difficulty was met by the superposition in the fore part of the ship of two turrets and a conning-tower. This plan, however, besides extending the area offered as a target to an enemy, results in an awkward distribution of weights, which may lead to serious disadvantages from the point of view of navigation. The same criticism might be urged also in regard to the *Florida* class, which appears to be a rejoinder to our *Neptune*. The Japanese, on the other hand, appear to be hesitating as regards the all-big-gun principle, the arrangement of the magazines in that country's battleships seeming to offer some difficulty, a remark which, in a measure, might be extended to ships and designs of other navies. The reason for this may be said to lie in the fact that experience has not yet been gained abroad on many points. As far, however, as regards our own battleships, whether their nautical qualities be considered, or the reduction of the target offered to the enemy's fire, or the complete utilization of the firing field, or, again, the suitable arrangement of the ammunition-rooms, they give complete satisfaction. Foreign naval authorities are aware that such is the case, no very great mystery having surrounded the performance of our ships.

Naval architects on the Continent, when they have been asked to take in hand the reorganizing of foreign fleets, with the object of making the separate units of the fleets in question equal, if not superior, to our own

taken as standard, have considered an increase of the armament by the provision of twelve 12-inch guns in place of ten, by placing three guns in each of the fore and aft turrets. A triple-gun turret, from the point of view of construction and working, involves no new or unknown risks. It does not call for any new mechanical system or device; those used for double-gun turrets serve after being made either stronger or more numerous. Its total weight will lie between the $\frac{4}{3}$ and the $\frac{5}{4}$ of that of a turret containing two guns. The lateral surface of the turrets—that directly exposed to an enemy's fire—will, in round figures, lie in a ratio comprised between 1 to $\sqrt{\frac{4}{3}}(=1.154)$ and 1 to $\sqrt{\frac{5}{4}}(=1.118)$. Therefore, both from the standpoint of weight and from that of total exposed surface, there is a marked advantage in favor of two turrets, each containing three guns, as against three turrets, each containing two guns. Notwithstanding a very general tendency to the contrary, care must be had not to take as a basis for comparison the fact, which in itself cannot be gainsaid, that the turret covering three guns forms, by reason of its greater dimensions, a larger target than one covering only two; for, owing to present ranges of firing, no gunner will be able to assert in advance that he will hit such and such a part of a ship. The rounds will be divided according to the laws on the dispersion of firing, over the whole ship aimed at, and therefore the chance of a three-gun turret being hit will only be in proportion to its size as compared with the total vulnerable area of a ship. If the matter be considered from another standpoint, it may be said that the greater mass of a triple-gun turret will enable it to resist under better conditions the effects of those projectiles which strike it without perforating its protective armor.

On the other hand, it is quite clear that a triple-gun turret, like any other scheme or device, is open to criticism, and we may briefly consider also what can be said against it.

The first point is that by adopting three-gun turrets the fraction of a ship's armament which may be rendered unserviceable by a single shot is larger than would be the case with the usual type of turret. This, however, is an argument which can be applied with even greater force to two-gun, as opposed to single-gun, turrets. If we take, for example, and simply for the sake of comparison, the armament of one of the newest Japanese battleships, and if we contrast the consequence of the loss of one of its turrets with a similar loss in, let us say, an improved battleship of the *Dreadnought* class, fitted with triple-gun turrets fore and aft, there would remain ten large guns on the Japanese battleship, as against nine only on the improved battleship. The state of inferiority of the latter is apparent, but this would not necessarily prove decisive. If the same process continued, the loss for the improved battleship would become more important still; she would have only six guns remaining, as against eight on the other battleship. In order to decide in actual warfare whether a risk should be run or not, the advantages existing before the risk has resulted in danger have to be duly weighed, and this will always depend upon the value which, rightly or wrongly, as subsequent events only can prove, had been attached to such prospective advantages.

If the causes which may lead to the silencing of a turret be now considered, there appears no reason whatever to suppose that those which result from the enemy's fire will have a more disastrous effect upon a triple-gun turret than upon a double-gun one. Of course, if a 12-inch shell should pierce a turret and explode inside, the men will be killed and the guns will be put out of action. Even if the guns themselves are not seriously injured, the sights, the ammunition hoists and the turning gear will be destroyed. But it is not expected that every shot which hits will pierce the turret, else there would be no use in armor-plating it. The three-gun turret will be very little more exposed to a direct shot than the two-gun variety, while to a glancing, or a part spent, shot, it will oppose

greater weight and inertia, and so be no more likely to be jammed on the roller race. It would be quite easy in this respect to follow the same line of argument as that which obtained when double-gun turrets were first suggested; former naval experts had to fight the objections raised against the latter, and did so effectively. Several examples from recent naval engagements tend to show that the placing *hors de combat* of a whole turret will form an exception, and not the general rule.

With regard to jamming of a turret proceeding from some cause inherent to the mechanism—and in this connection lateral shifting has specially to be borne in mind—there is no reason whatever to believe that the chances for this happening would be different in two types of turrets, both of which had received equal care in their design and construction. The other devices of a turret covering three guns may, perhaps, run more risks than the lateral training device, since they are in greater number in such a turret than in a double-gun one. If, however, they are so mounted as to interfere only with the firing of the gun they belong to, should they become damaged by an enemy's fire, the other guns being free to act—and such would certainly be the case—the turret would not be totally silenced.

The shock due to the firing of one of the lateral guns of a triple-gun turret is another point to be considered. In a triple-gun turret, the moment of the force producing a tendency to lateral shifting on firing is greater than that which obtains in a double-gun turret. The motive force—that is to say, the traction upon the brake—is the same, but the lever arm is about twice the length of that of an ordinary turret. The moment of resistance is a function of the mass; of the radius of gyration, of the friction which may be styled normal friction, since it occurs at the rollers and their axes; also of that friction which may be called the "artificial," seeing that it would occur in the devices introduced with a view to reduce as far as possible the extent of lateral shifting.

Mass, radius of gyration and normal friction, of course, increase in somewhat large proportions in the case of a triple-gun turret. But it is quite within the capacity of engineers, by suitable mechanical arrangements, to place the triple-gun turret, as regards extent and angular velocity of lateral shifting, in absolutely similar conditions to those which rule in a double-gun turret, and which are suitable for service conditions. This, although an assumption, rests on sufficiently obvious grounds to dispose of the argument on lateral shifting which might be raised against the triple-gun turret as compared in this connection with the double-gun one.

There would remain questions of detail—such, for instance, as those appertaining to the arrangement of the sighting devices and the auxiliary apparatus for firing the guns, these points, however, lie apart from a general review of the subject, and need scarcely be mentioned, for it is certain that the responsible officials of the leading ordnance firms, both here and on the Continent, have already conquered greater difficulties than these, and are far from the end of their resources. Another point might also be raised, and it has its weight, if not for its value, at all events for its eventual consequences. It is to the effect that no such turret has so far been mounted on board a battleship.—*Engineering.*

MARINE ENGINEERING.

TRIAL OF THE MELVILLE-MACALPINE SPEED-REDUCTION GEAR.—*A Report of Tests of the Double-Helical Spur Gear for Reducing the Speed of Marine Turbines.*—A unit of the Melville-Macalpine speed reduction gear for application to marine turbines, designed to transmit 6000 horse-power, has been under test for some weeks at the works of the Westinghouse Machine Company, of East Pittsburg, Pa. The results show a remarkable efficiency, exceeding by over 3 per cent the most sanguine expectations of the inventors.

"The first trials of the gear were made at very moderate speeds and

loads, with frequent stops to examine the condition of the teeth and bearings. During the first few days the speed was gradually raised to 1500 revolutions per minute of the turbine shaft (equivalent to a speed of 5500 feet per minute on the pitch circle) and 300 revolutions of the gear shaft, and a load of over 6000 brake horse-power was carried. The load was limited only by the power of the turbine, as there were no indications that the ultimate safe capacity of the gear had from any standpoint been nearly approached."

On October 16, 1909, an endurance test at maximum load and speed was begun at 3.15 p. m. and continued for 40 hours. The load was applied by a specially-designed hydraulic dynamometer. During the trial the average speed was 300.6 revolutions per minute, and the average brake horse-power recorded was 6048. There was nothing in the operation of the gear to indicate that this load might not be carried indefinitely, but the test was suspended at 7.15 a. m. Monday morning, on account of the inability of the power plant to stand so large a draft without interference with the regular operation of the works. No useful data, however, could have been obtained from a further prolongation of the trial, excepting the very probable development that as the wearing parts became polished and took on a better surface, the operation of the apparatus would improve. The trial continued over 34 hours after the temperature conditions had become constant.

The turbine used in the test was carefully calibrated at 1500 revolutions per minute with a vacuum of 22.78 inches, corrected to a barometric pressure of 30 inches. At every load, therefore, before reading the inlet pressure, the speed of the turbine was brought exactly to 1500 revolutions, as indicated by a vibration tachometer, and the vacuum adjusted to exactly 22.78 inches. The results of a series of readings were as follows:

Inlet Pressure Absolute.	B. H. P. Delivered by Gear.	B. H. P. of Turbine from Calibration Curve.	Efficiency.
111.8	3,712	3,771	98.7
122.3	4,156	4,197	99.0
132.3	4,576	4,623	98.9
142.3	5,036	5,108	98.7
152.3	5,486	5,567	98.5
162.3	5,927	6,057	98.7

A check on these figures of efficiency was obtained by calculating the heat loss in friction from the quantity of oil circulated through the gear and the rise in the temperature of the oil. Giving due weight to both methods of measurement, and considering the closeness of agreement between them, it is quite evident that at approximately 5000 horse-power, with the turbine running at 1500 revolutions per minute and the driven shaft at 300 revolutions per minute, the efficiency of the gear is more than 98.5 per cent. Less elaborate and extensive determinations show an efficiency of 98 per cent at a load of 3000 horse-power and 1000 revolutions of the turbine, and 95 per cent at a load of only 824 horse-power and 750 revolutions of the turbine.—*Engineering News.*

MARINE PROPULSION BY ELECTRIC MOTORS.* By H. A. Mavor.—At first sight it would appear that on a ship the direct connection between the power generator and the propeller renders unnecessary the use of any intermediate transmission device, and so long as reciprocating steam engines were the best attainable power generators it was possible to correlate the speeds of generator and propeller so as to gain the best efficiency of each. The steam turbine and the non-reversible internal combustion engine introduce a new set of conditions. On land the turbine holds the field for the largest powers, and because its speed of revolution is unsuited

* Abstract of a paper read before the Institution of Civil Engineers, December, 1909.

to any ordinary mechanical direct application of power for industrial purposes, its evolution has been directly associated with electrical transmission. These turbines are many of them of the same order of magnitude as the turbines used on shipboard, and therefore a comparison of economy in the two conditions is inevitable.

Before the introduction of electric transmission the marine engineer had the more complete scientific data, and consequently the marine engine held the blue ribbon of economy which now belongs to the turbo-electric generator. Among the reasons for the higher efficiency of the land turbines are: That the engineer on land is freer than is the marine engineer to adopt a suitable speed of revolution; that the land turbine runs at approximately constant speed for all loads, and can therefore be run on the governor, rendering easier the application of superheat and augmented vacuum; that on land it is possible to subdivide the power units to meet the conditions of varying load, and thus maintain at the smaller loads an efficiency not materially different from the efficiency at the full load of the system; that at sea, change of power is directly associated with change of speed, and the whole of the power units must always be in motion while the ship is in motion. The same engine has to run the ship at 10 knots and at 20 knots, although the power varies very widely between those limits. Also the high economy on land of power production, associated with electric transmission, is largely due to the possibility of exact measurement of power under all conditions of load, giving a complete knowledge of the effect of all changes in the apparatus or in the methods of working it.

The proposition here made is to provide an electric equipment intermediate between the prime mover and the propeller, extending the limits of practical economy in each by modifying the restrictions which the prime mover and propeller impose upon one another, and providing that the prime mover may operate at or near the constant speed required for the attainment of maximum efficiency and full power, and that the power expended in driving machinery not required for work is reduced to a minimum or entirely eliminated. At full power all the elements of the generating plant are in full operation, and the whole power resources can be concentrated on driving the ship. When full power is not required, the generating plant may be shut down in sections.

To accomplish these ends special motors have been designed, which give the necessary changes of speed and direction and permit of the advantageous combination or elimination of the power generators. These motors involve no new electrical principle, but simply mechanical adaptation of well-known electric designs. Alternating current alone is available for the purpose in question, and normal motors have therefore a fixed speed of rotation, which is a simple multiple of the generator of speed.

Two methods of speed change are proposed, each associated with a new form of motor.

The principle of operation of the "Spinner" motor is, that an ordinary normal motor driving the propeller at a fixed speed, with the shaft and propeller directly connected, is so arranged as to be rotatable as a whole about the propeller-shaft axis. This rotation is accomplished by a second motor concentrically arranged outside the first, so that the main motor system may be rotated in either direction—again at a fixed speed, which is a simple multiple of the generator speed—and the speed of rotation of the propeller shaft and of the propeller in the water is the algebraic sum of the rotation of the main motor and the rotation imposed upon it by the auxiliary motor.

As both motors are reversible, it will be seen that in each direction there are three speeds:

1. The speed of the main motor system: the middle speed.

2. The speed of the main motor system minus the speed of the auxiliary motor system: the low speed.

3. The speed of the main motor system plus the speed of the auxiliary motor system: the full speed.

The combination may be designed for any three-speed ratios, such as 1, 2, 3; 2, 3, 4, etc. Any intermediate speeds required are attainable by adjustment of the turbine or engine governor, which can be operated economically through a range down to about 75 per cent of full speed. The same method is applicable to non-reversible internal combustion engines.

The "Multiple" motor is an ordinary squirrel-cage induction motor in all respects, except that its stator is wound with two or more independent electric circuits, each associated with a separate source of supply of energy. For example, the motor may be fed from two sources of supply at 25 and 50 periods, respectively, the motor windings being for 46 and 92 poles. At full power and speed, both windings are in operation under their most advantageous conditions; each of these windings results in a synchronous speed of 66 revolutions per minute. When the 25-period current is supplied to the 92-pole winding the speed is 33 revolutions per minute.

Either of these motors permits of one or more generators being used together in the same mechanical system without electrical connections or synchronizing devices.

The author then goes on to discuss the application of electric propulsion to certain definite types of ship, and also gives diagrams illustrating the saving in space obtained. The examples worked out are as follows:

1. In a cargo vessel of 840 shaft horse-power, the normal reciprocating engine equipment with a single screw would weigh 570 tons for engines, boiler and fuel. The electrical equipment, consisting of three oil engines, three motors and three propellers, would weigh only 270 tons, including fuel. Further, with coal at $4.75 (20s.) per ton, and oil at $9.50 (40s.) per ton, the saving in fuel-cost on a total of $82 (£17) would be $25 (£5 6s.) per day at full power.

2. In a similar cargo vessel gas engines might be used. Taking an equipment of 770 shaft horse-power, and using three gas engines and one multiple motor, the respective weights of the normal and proposed equipments would be 446 tons and 229 tons. The consumption of fuel shows an equally favorable comparison.

3. A third cargo vessel, but of 1030 shaft horse-power, is worked out for the purpose of illustrating the application of steam turbines to the multiple motor. One plant drives the ship under normal conditions: extra power is supplied by a small turbo-generator, and is used to keep up the ship's speed in heavy or contrary weather.

4. On a passenger vessel of, say, 16,200 shaft horse-power, the electrical equipment permits of a subdivision of the plant, so that at speeds lower than the maximum, only part may be run, and that at full power. This advantage is gained without loss in full-power economy, and without additional complication.—*International Marine Engineering.*

A HYDRAULIC TRANSMISSION GEAR FOR MARINE TURBINES.—*A Brief Description of the Föttinger Speed Reduction and Reversing Device.*—Two months ago we devoted some space in these columns to a description of the spur-wheel speed-reduction gear devised by Rear-Admiral George W. Melville and John H. Macalpine for interpolation between the marine steam turbine and the propeller shaft. Another solution of the turbine speed problem of equal interest and promise is described in *Engineering* for November 5, 1909. This is the Föttinger hydraulic transmission system, which has been under test at the works of the Vulcan Company of Stettin, Germany, since the autumn of 1908, and which has recently been installed in a vessel built especially for the purpose of testing the efficiency of the system in actual service. The detailed description and elaborate illustrations of the apparatus in *Engineering* we are unable to reproduce; the abstract following indicates only the general features of the design and possibilities of the system.

Dr. Föttinger was first attracted to the problem from the electrical side. After several experiments with various arrangements, he designed a differ-

ential dynamo in which the armature was mounted on a primary shaft and a magnetic field on a secondary shaft, on which also there was an armature, and outside or alongside of it a stationary magnetic field. This device, while giving a combined efficiency of 87 per cent, was complicated and expensive, and Dr. Föttinger was impelled by the results of subsequent researches to the evolving of a differential water-turbine transmitter, in which the primary water wheel, driven by the steam-turbine shaft, transmitted, with a certain velocity, water through guide blades or directly to a secondary wheel or wheels mounted on the secondary or propeller shaft in the same axial plane. In this way it was found possible to provide for transmission ratios of 3 to 1 up to 12 to 1. By an arrangement of guide blades and buckets it was possible to have on the same shafts a reversing water-turbine transmitter of somewhat similar design.

After fourteen months' trial of the transmitter in the electrical power station of the Vulcan works, the device was installed in a vessel built especially for the purpose of testing its efficiency in actual service. The dimensions of the boat are as follows:

Length over all	96 feet 4.7 inches
Length between perpendiculars	91 feet 0.5 inches
Moulded breadth	14 feet 3.2 inches
Depth	8 feet 0.5 inches
Displacement	76.7 metric tons
Midship section	52.75 square feet
Coefficient of fineness	0.432
Submerged area	931.11 square feet

The vessel was designed for a speed of 12 to 13 knots. The power required is about 430 indicated horse-power, corresponding to about 500 primary horse-power of a transmitter. Steam at 17 atmospheres pressure is supplied by one water-tube boiler of the small-tube type to a four-stage Curtis turbine, fitted with a governor to prevent the turbine from running at a higher speed than 1900 revolutions per minute. The transmitter was fitted immediately abaft the steam turbine, though it may also be fitted before the stern tube at the end of the shafting.

"The transmitter consists of two chambers of cast iron, the after one for driving the propeller shaft ahead at a reduced speed, and the forward one for driving it astern, also at a reduced speed. This arrangement may be altered so far as the disposition of the respective transmitters is concerned. Each of the transmitters is alike in principle. They consist of a primary water-turbine wheel mounted on the primary or steam-turbine shaft, and one or more—in this case two—secondary water turbines mounted on a secondary or propeller shaft, with one or more stationary guide wheels interposed at any place of the circuit. The wheels and blades are of bronze, and the wheels are keyed to the shaft. The series of primary and secondary wheels and guide blades constitute a complete cycle, and the water moves in a constant compact flow, the primary wheels taking the water again immediately from the last secondary wheel; but guide blades may be interposed should this be considered necessary. The water, of course, impinges on the whole circumference of the turbine wheels. The water is given pressure and velocity in the primary wheel, which is coupled to the steam-turbine shaft, and delivers the water, in this case of ahead circuit, directly to the first secondary wheel; in this wheel only part of the energy, especially velocity, is absorbed in driving the propeller shaft. The water then flows through stationary guide blades, which are connected to the casing, and, leaving these blades, passes through the second secondary turbine, which absorbs the remainder of the energy; the water still flows at a certain velocity to the primary wheel. The first, and certainly the second, secondary wheel is reactionary. The blades of the primary water-turbine are curved back, while those in the first secondary water-turbine correspond to ordinary impulse water-wheel blades. The guide-

blades are similar to those in reaction water and steam turbines. The blades in the second secondary wheels are nearly radial and in some cases quite radial. The clearances are similar to those in ordinary steam-turbine practice. All spiral casings and connecting tubes to the primary centrifugal pump and secondary turbines are wholly dispensed with.

"The medium for driving the transmitter is fresh water, which is satisfactory from the point of view of friction and of density. No difference in efficiency has been noticed, even when large quantities of oil, saline or other impurities have found their way into the water. The transmitter is supplied with water by the small centrifugal pump driven from the steam turbine through bevel gear upon an extension of the turbine placed at the forward end. This absorbs about 0.5 per cent of the power of the steam turbine. The pump maintains a constant, but slight, pressure in the pipes between the supply tank and the maneuvering valve, which consists of several chambers within a casing. The pump serves for supplying the water when maneuvering, and for replacing the leakage. It is beneath the water level in the feed tank, so that there is always a suitable column to ensure efficient suction. Normally there is always sufficient pressure of water in the valve chambers to enable the water supply for the transmitters to be withdrawn from one or other of the two transmitters, and to pass it to the other."

Reversing is accomplished by an admission valve controlling the flow of water to the admission nozzles or ports in the ahead or astern turbines. On the occasion of a recent trial, the turbine running at 1600 revolutions and the propeller shaft at about 270 revolutions ahead, the lever for controlling the valve for filling the astern water turbine and emptying the ahead water turbine was thrown over, and in 19 seconds the shaft was running at 250 revolutions astern. The return to full speed ahead from full speed astern was accomplished in even less time.

The transmission efficiency in this test is shown in the article under review in three diagrams, showing, respectively, the progressive power curve, the efficiency curve at progressive powers, and the results of a brake test at 1100 revolutions per minute. The efficiency curve at progressive powers shows that the efficiency of transmission in the ratio of 4.5 to 1 rises very rapidly. From 78 per cent at 600 revolutions of the primary shaft, it advances steadily until 1250 revolutions are reached, after which the efficiency remains constant at 83 per cent. In the third diagram mentioned above, the curve of the primary horse-power shows nearly constant power rate for a very wide range of secondary speed. Between transmission ratios of 5 and 3.7 it exceeds 80 per cent and between 6 and 3.5 it exceeds 75 per cent. In case regulating devices as in modern water turbines should be employed the range of highest efficiency will be still greater. The efficiency may be further increased by utilizing the heat generated by friction in the water turbines to raise the temperature of the boiler feed water. It is estimated that about 15 per cent of the energy supplied to the transmitter is transformed by the friction of the water and other losses into heat. The temperature of the boiler feed may be raised 36° to 45° F. by using the feed water for filling the turbines before it enters the boilers.

"The system has very considerable potentialities. It enables the turbine to be overloaded without increasing the revolutions of the turbine, and secures for a slow-running propeller all the advantages of the turbine, with its high efficiency and its freedom from oil in the condensed water, a very important factor in marine installations. The introduction of the reversing system permits of the continuous use of the economical high-speed ahead turbine, irrespective of ahead or astern steaming; and this, in ships which are frequently reversed, is an important factor. Moreover, the same power is available for going astern as for going ahead, while the adoption of large-diameter and large-area propellers gives greater propulsive power in reversing and maneuvering. In the event of any frac-

ture of the shaft or the propeller involving over-racing, the transmitter acts itself as a relief governor to the turbine."

As regards the application of the system to torpedo-craft, there are no smaller potentialities, as in service their turbines will require to be often manipulated for maneuvers. Besides improving the maneuvering qualities, however, the installation of the Föttinger transmitter reduces the space requirements of the propelling machinery. Comparative designs of torpedo-craft turbine installations, with and without the Föttinger apparatus, plans of which are shown in the article under review, show the following data:

	Without Transmitter.	With Transmitter.
Horse-power of turbines	3,700	3,700
Turbine speed, r. p. m.	800	2,200
Propeller speed, r. p. m.	800	480
Over-all length of each turbine unit, meters	4.15	3.87
Total weight of machinery	18.3	14.6
Saving in length, per cent		6.7
Saving in weight, per cent		20

The saving in weight is reduced to about 10 per cent when the heavier shafting and propellers are included.

We summarize also similar comparative designs for battleship installations. The typical turbine installation without the Föttinger apparatus taken as an example in this case includes on each of the three shafts a high-pressure, a low-pressure and an astern turbine, the units being independent and in separate water-tight compartments, with a condenser associated with each set. The auxiliary machinery is, of course, identical in the two cases.

	Without Transmitter.	With Transmitter.
Total brake horse-power	30,000	30,000
Turbine speed, r. p. m.	275	720
Propeller speed, r. p. m.	275	125
Total length of machinery, meters	15.6	12
Total area machinery, sq. meters	312	240
Total weight of turbines, tons	592	376
Saving in length, per cent		21
Saving in area, per cent		23
Saving in weight, per cent		36

The net saving in weight when the heavier shafting and propellers are taken into account is about 17 per cent.—*Engineering Magazine.*

APPLICATIONS OF ELECTRICITY TO PROPULSION OF NAVAL VESSELS.* By W. L. R. Emmet.—The figures and statements given in this paper are not mere theories based upon supposed possibilities, but in all essentials are accomplished facts, the nature of the case being such that we need not go beyond the scope of our actual experience to accomplish the purposes here proposed. These plans are actual designs worked out in every significant detail, which might be, and, if opportunity offered, would be contracted for and fully guaranteed.

The data and information given relate to two distinct methods, both adapted to the propulsion of battleships of the design of the *Arkansas* and *Wyoming*. Either plan is fairly indicative of possibilities in other war vessels, although each case must be designed on its merits if the best results are to be expected. In the first of these methods, which will be

* Read before the Society of Naval Architects and Marine Engineers, New York, November, 1909.

spoken of as "Combination Drive," generating units with motors and low-pressure turbines on propeller shafts are used together and separately for different conditions. In the second method, called here "Electric Drive," the propulsion is wholly by electric motors. The first of these plans was made the subject of a proposition to the Government for one of the new battleships, the turbine part being designed by the Fore River Shipbuilding Company and the electrical part by the General Electric Company. The second has been designed since the bids for these ships were opened.

In both of these designs the steam conditions specified by the Navy Department, namely, 260 pounds gage and 50° F. superheat, have been used in calculating results. In both cases vacuum diminishing with load from 28.5 inches at 12 knots to 27 inches at 20.5 knots has been assumed. The Parsons curves given have been taken from guarantees without knowledge of vacuum proposed. If the vacuum is better than 27 inches, the Parsons water rates at the high speeds should be higher than those given by curves.

COMBINATION DRIVE.

With this drive it is proposed to use twin screws and to install upon each propeller shaft a low-pressure turbine and an electric motor, both of these being installed in the engine room provided for in the design of the ship. We would also install in each engine room a high-speed steam turbine generating set. The capacity of the generators and motors would be such that they would be capable of delivering, at 20.5 knots, two-fifths of the total power required for propulsion. The remaining three-fifths of the power under these conditions would be delivered by the low pressure turbine, which at such a time would receive steam exhausted from the generating unit. This low-pressure turbine would also be fitted with two reversing stages, similar to those which would be adopted with direct-turbine drive.

Table 1.—Combination Drive.

Knots	12	13	13	14	14	16	18	20	20.5	21
Shaft horse-power	4,400	5,500	5,500	6,900	6,900	10,450	15,350	22,700	26,000	30,700
Sum of motor output	4,400	5,500	5,500	6,900	6,900	8,750	10,000	11,250	11,700	12,350
Low-pressure turbine output						1,700	5,350	11,450	14,300	18,350
Number of poles on motor	42	42	42	42	28	28	28	28	28	28
Motor speed	131	142	142	153	153	175	198	224	232	240
Motor efficiency	94.5	95	95	95.5	95.5	95	95	95.5	95.5	95.5
Vacuum	28.5	28.5	28.5	28.5	28.25	28	27.75	27.25	27	27
Generator speed	1,400	1,510	1,510	1,625	1,085	1,250	1,370	1,580	1,645	1,710
Number of generators	1	1	2	2	2	2	2	2	2	2
Flow and leakage	52,300	62,700	67,000	82,500	92,000	133,700	195,700	276,300	315,000	366,500
Water rate for motor output	11.9	11.4	12.2	12.0	13 3	15.25	19.7	24.75	26.9	30.3
Low-Pressure Turbine.										
Bucket efficiency						50	52	58	59.5	60
Flow						37,800	114,000	221,000	274,000	348,000
Water rate per shaft horse-power						22.2	21.4	19.30	19.1	19
Horse-power output						1,700	5,350	11,450	14.300	18,350
High-Pressure Part of Turbine.										
Bucket efficiency						61	64	67.5	69	70
Bucket water rate						30.5	29	27.5	27	26.6
High-pressure flow						39,700	119,500	232,000	288,000	365,500
Motor output						1.070	3,620	7.500	9,550	12,350
Motor output from cond. part						7,680	6,380	3,750	2,150	
Corresponding flow						93,000	75,200	44.300	26,000	
Total flow, including leakage	52,800	63,500	68,500	84,600	93,500	133,700	195,700	277,300	315 000	366,500
Water rate per shaft horse-power	12	11.6	12.5	12.2	13.5	12.8	12.75	12.25	12.1	12

The low-pressure turbines would also be so arranged that they could take high-pressure steam from boilers through separate nozzles, and with such supply they would act as fairly efficient high-pressure turbines. With such high-pressure steam supply the ship would make a speed of about 19 knots with the same steam required for 20.5 knots with the combination drive.

This turbine has two exhaust openings, one connecting to the second stage and the other to the fifth stage. When the ship is running at about 20.5 knots all the steam would pass through the first of these exhaust openings to the low-pressure turbine, its pressure between the two being about 50 pounds absolute. When the ship operates at speeds below 15 knots the low-pressure turbine would not be used at all, the power being delivered to the propellers entirely by motor and being all generated by the high-speed turbine. At speeds between 15 and 20.5 knots, a part of the steam would pass to the condenser through the low-pressure turbine, and part through the lower stages of the high-speed turbine. The design of generating unit provides for a valve by which any desired number of third-stage nozzles can be closed, and by this means the division of steam between the low-pressure stages of the high-speed turbine and the low-pressure turbine can be controlled.

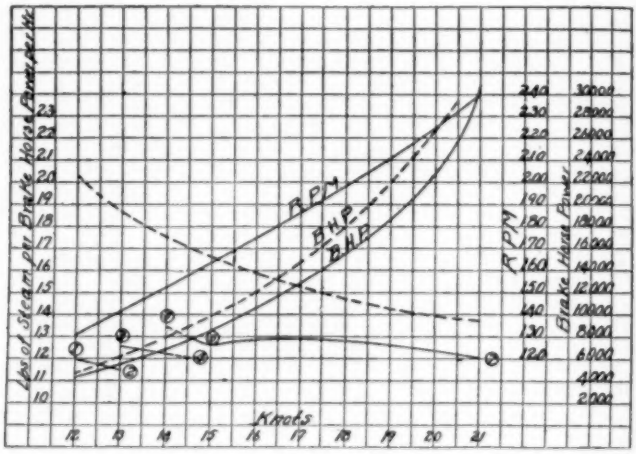


FIG. 1.—Curves showing steam consumption with combination drive compared with guarantees on Parsons equipment for the same ship. Also power curves for both cases and propeller speed curve for combination drive. Dotted lines, Parsons drive; full lines, combination drive; line 1-2, one generator and motors connected for 42 poles; line 3-4, one generator and motors connected for 28 poles; line 5-6, two generators and motors connected for 28 poles; line 6-7, combined effect of motors and low-pressure turbines. At 7, all steam passes through low-pressure turbine, at other points only a part.

The curve sheet, Fig. 1, and the accompanying tabulation show all the relations of speed, power and efficiency.

It will be seen that in this plan the electrical apparatus acts simply as a speed-reducing bond between the generating turbines and the propeller shafts. The motors are not used for reversing, and are of the simple, squirrel-cage induction type. The voltage is low and the arrangement of generator and motor constitutes the simplest known means of electrical power transmission. With such apparatus, insulation trouble or mechanical trouble is practically unknown, and there is no other form of mechanism which can accomplish such results with equal simplicity and certainty.

Since in a warship it is desirable to operate efficiently at low speed as

well as high, the motors proposed in this case are so arranged that they can be connected either for 28 or 42 poles. In the higher-speed ranges the 28-pole connection is used, and in the lower-speed ranges we use the 42-pole connection. This change of connection is made by a single movement, which actuates a group of toggle switches, so designed that their action is perfectly positive and dependable. These switches could be so arranged that they could not be moved when the circuit was energized, so that no trouble could result from opening or closing them under load.

In this arrangement the electrical apparatus, with high-speed turbine, constitutes an auxiliary, the purpose of which is to improve efficiency under all speed conditions, and particularly to adapt the ship to economical operation at cruising speed. These results it will accomplish without the introduction of any feature which can be considered problematical. Turbine generating units exactly equivalent to that proposed are being widely used with better efficiencies than those here assumed, and motors of similar character, size and speed are delivering uniformly successful work under the most difficult conditions, such as mine hoisting, rolling mill work, etc., and mechanical or electrical trouble with either class of apparatus is of inappreciable extent.

This combination plan, as here explained, was decided upon largely with a view to overcoming the doubts and fears which might be raised by the proposition to introduce such a novelty into the new battleships. The arrangement might have been made lighter and less expensive by adapting the motors to reversal so that the reversing turbine could be left out. This would have necessitated changing poles in the ratio of 2:1 instead of as proposed, but the results obtainable with suitable designs would have been nearly the same. The reversal accomplished in this way would have been just as quick and effective as that afforded by the reversing wheels. Another feature of this scheme which it was hoped might allay the doubts and fears of uninformed persons is the fact that it could be readily convertible into a direct turbine drive.

ELECTRIC DRIVE.

Since the completion of these designs for combination drive and their rejection by the Government, the writer has designed an equipment somewhat similar in principle, in which the whole power is delivered to the propeller shafts by means of motors. On each propeller shaft it is proposed to install two motors, one of which is arranged with pole-changing switches, so as to adapt it to use at lower speeds, this motor being similar in character to that proposed with the combination drive. The other motor is adapted only to the smaller number of poles used with high speeds, and is arranged with a resistance connection to its motor so that it is suitable for producing the high torque desirable in quick changes of the ship's direction. The generating units proposed in this case are of a type representative of the highest development which has been attained. They are designed to give a very uniform efficiency through wide ranges of load and speed, so that they will accomplish the various functions desired with the best general effect. The voltage of these generators and motors is such as to give the simplest and most dependable windings for apparatus of the size, the maximum potential generated being about 2200 volts.

The results in steam consumption at different speeds obtainable by this equipment are shown in Fig. 2. The water-rate curves there given refer to the propelling machinery alone, and do not include any other steam consumptions. The dotted curves on the same sheet show guarantees made on Parsons turbine equipment for the same ship. These Parsons curves presumably make some allowance over the results expected. It will be observed that the Parsons power curve is considerably higher than that assumed for the electric or combination drive. A large part of this difference is, however, certainly attributable to the fact that the proposed Parsons equipment operates with four propellers and much higher propeller speeds, which will

give a lower efficiency to the propellers themselves and a lower propulsive efficiency of the ship, since one propeller is bound to interfere with the action of the other. The water-rate curve given for the Parsons equipment seems fairly representative of the results claimed for the best Parsons designs. It agrees closely with the curve of water rates calculated for the Curtis turbine for a similar ship.

Propeller Speed.—In designing this electric drive we have adopted, for the sake of comparison, the same propeller speed used with the combination drive, and this in turn was taken for a similar reason from that proposed for direct propulsion by Curtis turbines. In the combination drive it will be desirable to keep to the best Curtis turbine speed, since a large proportion of the power is delivered by turbines. In the electric drive, however, we are not limited as to propeller speed, and it would be possible to adopt considerably lower propeller speeds, and by so doing to improve the net result without serious increase of weight.

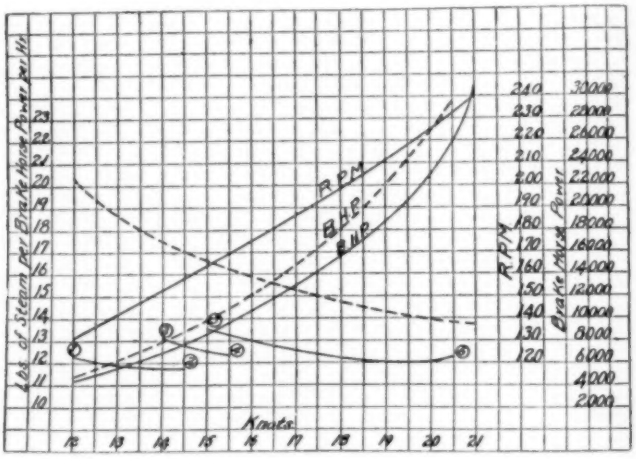


FIG. 2.—Curves showing steam consumption of electric drive compared with results guaranteed on Parsons equipment of the same ship; also power curves for both cases and propeller speed curve for electric drive. Dotted lines, Parsons drive; full lines, electric drive; line 1-2, one generator and two motors connected for 50 poles; line 3-4, one generator and two motors connected for 30 poles; line 5-6, two generators and four motors connected for 30 poles.

Data relating to the operation of this electric drive at different speeds are given in the accompanying tabulation.

Table 2.—Electric Drive.

Knots	12	14	15	15	18	20	20.5
Shaft horse-power	4,400	6,900	8,600	8,600	15,350	22,700	26,000
Motors, number of poles	50	50	30	30	30	30	30
Motor speed	131	153	164	164	198	224	232
Motor efficiency	94.5	95	96	96	96	96	96
Motor power factor	60	65	83	79	84	85	85
Generator speed	1,105	1,295	830	830	1,005	1,130	1,172
Vacuum	28.5	28.25	27.50	28.25	27.75	27.25	27.0
Number of generators	1	1	1	2	2	2	2
Number of motors	2	2	2	4	4	4	4
Pounds of water per shaft horse-power	12.3	11.8	12.55	13.4	12.25	12.1	12.3

Reversal.—The characteristics of the motors used in reversal of the propellers are shown by curves, Figs. 3 and 4. Fig. 3 shows the torque and current of such a motor under different speed conditions with full impressed voltage and frequency, two of the curves applying to the condition without resistance in the armature and the others applying to the condition with resistance in the armature. Fig. 4 shows the torque obtainable

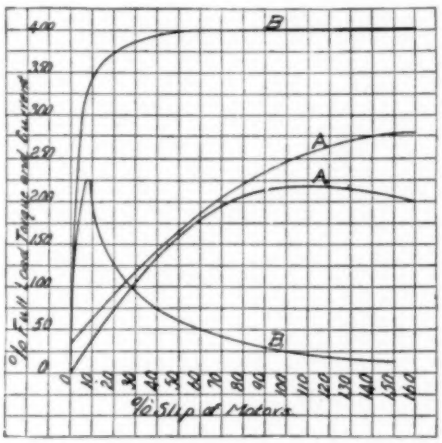


FIG. 3.—Speed, torque and current curves of motors with full frequency and voltage. *AA*—Current and torque with resistance. *BB*—Current and torque without resistance.

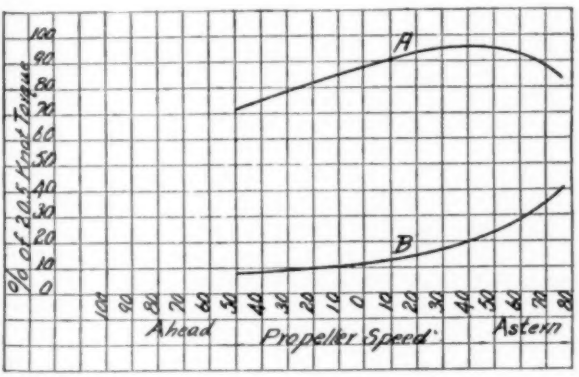


FIG. 4.—Torque and current curves of motor as used, with resistance inserted, in reversing ship. These curves assume normal frequency and reduced voltage. In practice, both frequency and voltage might be reduced, which condition would give better torque. Speed is given in per cent of full frequency. Ahead means against generator; astern, with generator.

with such a motor with and without resistances when supplied with the normal full-load current of one generator at normal frequency. These motors would be capable of receiving for a short time even more current than this, but the torque here shown is far more than that provided by the ordinary reversing machinery for turbine ships. Curve *B* in Fig. 4 shows the relatively weak torque obtainable without resistance in the motor

armatures. The results shown by this curve can be obtained from any of the motors; those on curve *A* can only be obtained from the motors which are arranged for the insertion of armature resistance. The armature resistances proposed would be connected to the motor through collector rings, and the resistance would be cut out by short-circuiting the collector rings, so that no current would pass through brushes except when the resistance was in use. A form of resistance has been developed by experiment by which a very large power can be dissipated in a small space without complication or difficulty, and this with all other details has been included in weight estimates.

Weights.—The weight of the Parsons turbines alone proposed for these ships, as designed and estimated by the Navy Department, is given as 4847 tons, which weight does not include any piping, bearings, shafting, valves or auxiliaries. The following figures show weights of equivalent parts with the combination drive and electric drive as here designed:

Combination Drive.	Pounds.
Two generators	125,000
Two turbines	154,800
Two motors with pole-changing switches	140,000
Switches, etc.	2,000
Additional ventilating ducts	5,000
Two low-pressure turbines	740,000
Total	1,166,800
Equals	520 tons

Electric Drive.	Pounds.
Two motors with pole-changing switches	142,000
Two motors (M)	134,000
Switches, levers, supports, etc.	6,000
Cables, busses, supports, etc.	4,000
Rheostats	3,000
Two generators	280,000
Two turbines, without bearings	218,000
Additional ventilating ducts	7,000
Total	794,000
Equals	354 tons

From this it will be seen that, considering these parts alone, the combination drive would be 35 tons heavier than the Parsons equipment mentioned, and the electric drive would be 131 tons lighter. In the comparison of steaming distances which is here made, this difference alone is considered, but a consideration of the designs will show that other large economies in weight would be effected with the electric drive. The piping system necessary with the Parsons turbine equipment is very complicated, and the weight of steam and exhaust piping and valves given in the department's estimates amounts to 76.5 tons. With this electric drive only one steam pipe connection is necessary inside of the engine-room. From this it will be apparent that there is a great saving of piping weight and complication in the electric drive as compared with the Parsons equipment. The writer has no means of knowing the necessary weight of piping outside of the engine-room, but it is believed that saving in the engine-room would amount to at least 40 tons.

The weight of boilers proposed for these ships is 555 tons, and if with the electric drive the boiler equipment was cut down in proportion to the saving in steam consumption at 20.5 knots, as indicated by the comparisons given above, a further saving in weight of about 108 tons would be effected. This estimate assumes that uses of steam outside of the prime movers are the same in both cases and in accordance with the department's estimates.

Table 3.

	Pounds Coal Available.	Water Rate.	Shaft Horse-power.	Distance in Knots at 12-Knot Speed.
Parsons	5,550,000	25.6	4,700	4,700
Electric	6,080,000	17.8	4,400	7,900

Cruising Distance.—The hull plans of these ships, as designed for Parsons turbines, show a bunker capacity of 2476 tons, or 5,550,000 pounds. Adding coal in place of weight diminutions above mentioned, the total would become 6,080,000 pounds. If we assume 8.5 pounds of water evaporated per pound of coal, and the propeller, steam and electrical efficiencies above indicated, we have the comparison shown in Table 3.

If the same boiler equipment is retained for both system the comparison will be as follows:

Table 4.

	Pounds Coal Available.	Distance at 12-Knot Speed.	Speeds with Equal Steam Flow.
Parsons	5,550,000	4,700	20.5
Electric	5,838,000	7,600	21.2

These figures assume that in both ships the steam consumption for all uses outside the main prime movers at 12 knots is 26,300 pounds per hour, this being the figure given in the Parsons guarantees.

It may be claimed that the Parsons turbine would do better than here assumed, the figures taken being guarantees which presumably afford some latitude for error. Comparison with other cases, however, does not indicate that the water rates assigned to this Parsons turbine are much too high. In the case of the *Lusitania*, where the high speed and large power afford ideal conditions for turbine drive, the water rate shown by tests at maximum speed was 12.77 pounds per shaft horse-power in the turbines alone with 28 inches vacuum, and with 27 inches vacuum it would presumably have been 13.5 pounds. A corresponding water rate shown by the Parsons curves here given, which form the basis of this comparison, is 13.75 pounds, with a horse-power output considerably less than half.

These figures show an increase of 69 per cent in the cruising distance, and it is needless to comment upon the immense value of such a difference in any war vessel.

In this comparison it should be remembered that the performances of the electric equipment are very conservatively estimated, and that water rates and efficiencies on existing apparatus would justify the expectations of better performances. It should also be remembered that differences in weight of piping are not considered in this comparison, and also that there should be a large saving in weight of bearings and supporting structures if the electrical equipment is compared with the Parsons turbines. It should further be considered that the propeller speeds here adopted are not those most favorable to electric drive, they having been assumed for the sake of direct comparison with existing designs for the same ships. The electric drive would give almost the same efficiency with lower-speed motors, and the weight would be only slightly increased, while a very large improvement in propeller efficiency could be effected. To get the best results from such a new method, the whole ship should be designed to suit it, while in the designs here given it is simply made so that it could be substituted for the proposed combination drive without any change except in the propelling machinery itself.

Evidences.—The practicability of the plan of electric drive here proposed cannot be questioned, and the figures given must result from the expected efficiency in generating units and motors. The motor efficiencies given agree with common practice with apparatus of similar capacities and speeds and cannot be questioned. The practicability of the generator efficiency

proposed can be proved by comparison with actual test results on a generating unit rated 3000 kilowatts, of which many are in use, and which have been repeatedly investigated with the greatest thoroughness. In almost all turbine units increase of capacity is decidedly advantageous to economy, and such advantage would exist in this case, although the efficiencies assumed are not superior to those shown by these actual test results.

Advantages.—In this plan for electric propulsion the electrical apparatus simply serves as a speed-reducing bond between the turbine and the propellers, and it may be asked why electricity should be used when the practicability of other methods of speed reduction have been asserted, and to some extent verified, by experiments.

The answers to this are:

First. Electricity is capable of efficiently effecting reduction in a very large ratio, the reduction in this case being in the ratio of 50:6.

Second. That the electric speed reduction is susceptible to change of ratio, which makes possible efficient action at different speeds.

Third. The electric speed change involves no kind of complication, difficulty or uncertainty.

The efficiency of this electrical bond will be about 92 per cent at all speeds, and this will remain constant through the life of the apparatus. It is questionable whether any other practicable form of speed reduction in such a ratio can be made equally efficient when all friction losses are considered, even if it should be proved that other methods are practicable at all for use in such large ships. The particular type of turbine proposed in this case affords the great advantage of good efficiencies throughout wide ranges of load and speed, which characteristics in combination with the pole changing in motors are of great value in such a case.

The possibilities outlined in this paper, if true, are certainly of great importance to the shipbuilding industry, since they open a field which is almost entirely new. The most important existing electric drive installations of which the writer has knowledge are those of two fireboats in the city of Chicago which were equipped under his direction. While these contain small and relatively inefficient turbines and electrical apparatus, their performance from the first has been efficient, simple and entirely free from trouble. While the present paper relates alone to the propulsion of certain battleships, the figures and facts which it presents are fairly illustrative of a wide range of possibilities in the propulsion of vessels; and while other cases have not been specifically investigated, it is thought that there are a very large number in which electric drive would be better, simpler and cheaper than anything heretofore produced.—*International Marine Engineering.*

SPEED-REDUCTION GEARS FOR MARINE TURBINES.—It has been obvious from the first application of the steam turbine to marine propulsion that its natural high speed introduced a handicap against which it had to labor when establishing a position as a suitable prime mover for the work. By the use of turbines of large diameter it has been possible to bring down the speed of rotation to a point at which the propellers can be run with high efficiency, but the best arrangements are even now somewhat of a compromise, and it is possible that if the number of revolutions could be further reduced a still higher propeller efficiency might be obtained. This belief has led to much suggestion, and some experiment towards speed-reduction gears, to be interpolated between the turbine and propeller shafts. Various schemes have been proposed—electrical, hydraulic and mechanical—and there is every probability of some of them being tried on an adequate scale.

On the face of it, the introduction of any type of gearing between the turbine and propeller is undesirable. It is frequently said that progress lies in the direction of simplification. Often enough this statement is false, but none the less it does stand for an aspect of truth. Many of the most

successful applications of mechanical principles are an outcome of the evolution of more complicated forms towards simplicity, and in the present case the introduction of a new link between a ship's turbine and propeller does represent a retrogression, a departure from direct application, which is inherently undesirable. None the less, it may prove advantageous to introduce, at all events in low-speed steamships, such a link, representing a stage in development, although it is difficult to think that a plant involving such link will constitute the ultimate solution of the problem.

For the moment the state of affairs is simple enough. The most economical speed for the turbine is not the most economical speed for the propeller, and *vice versa*. If it is possible to devise and construct some form of speed-reducing gear which will be as reliable as the rest of a steamer's machinery, and, at the same time, will be of such efficiency that the over-all efficiency of the plant will be so increased as to more than compensate for the extra capital cost, upkeep and weight involved, the case for the gear will be made out. Any such gearing, by allowing higher turbine-blade speeds than are at present used, will permit the fitting of a turbine not only more efficient than those now in use, but also lighter and cheaper. In the case of the propeller, matters will work in the opposite direction, as far as weight is concerned, the slower running propeller being heavier, and requiring a larger shaft. The efficiency will, however, be improved. Apart from the direct issue turning on speed and efficiency, other considerations come in, particularly with the electrical schemes, having reference to the arrangements which can be made for running economically at two or more different speeds. This point is of great importance in warships, owing to the well-known necessity for running during lengthy periods at either cruising or full speeds, and at speeds varying within narrow limits, when ships have to keep station in line maneuvers.

Of the various methods of dealing with this question, the employment of mechanical gearing is the simplest, and is likely to appeal to outsiders as the most desirable way of tackling the problem. The argument in favor of any solution on these lines must, of course, turn solely on the improved efficiencies of turbine and propeller which may be obtained. No practicable scheme of this sort is likely to touch the question of high efficiency at two speeds, or to offer any assistance in connection with the reversing difficulty. A satisfactory speed-reducing spur-gear would allow of increased efficiency in high-speed passenger boats, and might lead to the application of the steam-turbine to slow-speed cargo boats, for which at present it is quite unsuited. There is little doubt that gearing could be constructed of such high efficiency that the over-all efficiency from turbine to propeller would be markedly greater than is now obtainable for the slower-speed ships. With the 6000-horse-power gear constructed by Mr. Westinghouse, a test-plate efficiency varying from 98.7 to 99 per cent was obtained, while the experimental 300-horse-power gear tried by Mr. Parsons gave 99 per cent efficiency. Even assuming that these results are high for practical working, it is evident that a speed-reduction scheme on these lines is not likely to fail owing to the low efficiency of the gear. There is a natural reluctance among marine engineers to adopt spur-gearing for the main drive of ships, as the practical results in working such an installation is impossible to foresee. It is satisfactory, however, to know that these experiments are in competent hands, and in a year or so some practical data bearing on the question should be available. The Parsons Marine Steam Turbine Company, Limited, are now fitting the S. S. *Vespasian* with gearing and turbines of 1000 horse-power to replace the original reciprocating engines. It is interesting to reflect that the adoption of gearing on board ship would mark a reversion to earlier practice, in which spur-gearing was used to increase the speed of the propeller above that of the slow-running engines.

The various electrical schemes which have been put forward propose to achieve more than the mere increase of efficiency which would follow on

higher speed turbines and slower speed propellers. By splitting up the prime mover into suitable units they suggest methods by which a steamer may be run at various speeds always at, or near, maximum efficiency, as far as the turbines are concerned. This feature would be of more importance in warships than in merchant vessels. The partisans of the various electrical schemes point to the successful running of the innumerable electric-power stations scattered throughout the world, and insist that their proposals involve no new principles, but merely represent a new application of well-tried methods and apparatus. In a general way this may be granted, without such assent carrying with it an admission that their case is made out. The suggested advantage of splitting up the prime mover into such units that a certain part of the plant may be shut down, when a boat is required to steam at some speed lower than the maximum, is likely to be of little importance in the merchant service. It has been suggested that a steamship bears some analogy to a power-station, and that its load-factor is such that much economy might result from ability to shut down part of the plant at times of light load. It is doubtful, however, if there is much in this idea. The average passenger or cargo steamer runs for so large a part of its time at its maximum speed that little would be gained by the introduction of complicated mechanism merely with the idea of improving its efficiency at speeds other than the usual. With warships the matter is very different, and for the moment the electrical propositions have a much stronger case to urge with regard to them. With an ordinary passenger or cargo-boat it is difficult to see that an electrical speed-reduction system would have any advantages over a spur-wheel gear, assuming both equally successful; while the efficiency of the electrical scheme would certainly be less than that of the mechanical one, and its initial cost greater.

All propositions involving the use of an electrical transmission are apt to raise opposition among marine engineers. This opposition is not surprising. The voltages which it is proposed to employ are so high relatively to those which, up to the present, have been used on board ship that some doubt as to the likelihood of their success, under the special conditions, is easily understood. The scheme proposed by the General Electric Company, of Schenectady, involves the use of current at 2000 volts. To electrical engineers, used to the high voltages employed on land, this doubtless sounds reasonable enough, but to marine engineers matters appear in a very different light. The conditions at sea are likely to prove much more onerous than any which have to be met on land. Apart from the effect of a green sea down an engine-room hatchway, which could probably be guarded against, difficulties are likely to arise owing to the dampness of the air. With plants of large size, ventilating arrangements on an extensive scale will have to be made, and with high voltages it is difficult to think that trouble will not be experienced, owing to spray being drawn down the ventilators in bad weather. In this connection it is interesting to note that in Mr. Mavor's scheme a voltage of from 600 to 1000 is suggested, which is considerably lower than that proposed by the General Electric Company; while Mr. Parsons, in conjunction with Messrs Stoney and Law, has attempted to meet the insulation difficulty by a system of interwinding the generator and motor windings, so that the voltage of no part of the electrical system will differ greatly from that of earth.

The various electrical schemes which have been proposed all make arrangements for reversing, which do away with the necessity of fitting special reversing turbines, and in this respect they are superior to the spur-gearing proposals. The hydraulic transmission gear proposed by Dr. Föttinger would, however, appear to combine some of the advantages of the simple spur-gear drive with the reversing possibilities of the electrical method. The efficiency of the transmitting gear is lower than is likely to be obtained with a well-designed spur-gearing, but will probably compare favorably in this respect with any electrical scheme. As is generally

known, this apparatus has already been tried on a practical scale, and its development should be a matter of much interest. While it is impossible to suggest that this or any other of the numerous proposals is likely to form the final solution of an interesting problem, it will be evident that a large amount of skilled attention is being directed to the question, and some practical applications on a reasonably large scale are likely to be seen. It is quite possible that further improvement in high-speed propellers may ultimately render any form of reduction gearing superfluous, but for the moment the state of affairs justifies the attention which is being given to the development of some type of gear.—*Engineering.*

PROPELLING MACHINERY FOR WARSHIPS.—The inaugural address which was delivered to the Junior Institution of Engineers by Engineer Vice-Admiral H. J. Oram, engineer-in-chief of the fleet, on taking the presidential chair, is full of promise of future utility. The most substantial mistake made by those who invent and improve machinery of all kinds lies in producing that which is not really wanted, or cannot be used in the way intended. The mistake is normally the result of ignorance; not indeed of the principles of mechanics, but of the conditions on which any and every invention depends for its fitness. The modern machinery used in propelling vessels is all the result of hard work. Inventions are borne along the steadily flowing stream of time, continuously, without ceasing. Some come into harbor; the greater number sink. Admiral Oram recounted the recent history of the marine engine; and he supplied information which ought to do much to keep inventors from going astray, and wasting their time, their energies and their money on devices which are futile. If he had done nothing more than explain with full knowledge of his subject, that the conditions prevailing in a ship of war are so different from those existing in a merchant ship, that what may be excellent in one is inadmissible in another he would have done most excellent service. He has, however, done very much more than this, for he has dealt with almost every department of marine mechanical engineering, and supplied information which has in many cases been regarded as confidential for reasons which no one understands outside the Admiralty.

He began by comparing the reciprocating engines of the cruisers *Shannon, Minotaur* and *Defence,* of 27,000 indicated horse-power, and of the battleships *Lord Nelson* and *Agamemnon* of 16,750 indicated horse-power, with the yet more recent turbine engines of the *Indomitable* 41,000 shaft horse-power. The former are, of course, the last word in that type of naval engine, running as they do at speeds of 120 to 145 revolutions per minute, and a piston speed of 1000 feet. These things have been rendered possible by the use of forced lubrication. In destroyers the whole of the working parts are enclosed in an oil-tight casing. In the larger ships with reciprocating engines, pumps separate from the main engines are fitted for circulating the oil, the delivery pipes being provided in duplicate. The oil supply to them is first led to the main bearings and thence through the shafting to the others, and in these ships it was not considered necessary to apply forced lubrication to the crosshead pins or link gear. With a view to separating any water which might mix with the lubricating oil, owing to drainage from slide and piston-rod glands, an oil settling tank is fitted in each engine-room. It is all very pretty and simple—when we know how to do it. But this knowledge was not picked up in a moment. It is not, perhaps, too much to say that it is to forced lubrication the continued existence of the reciprocating engine in the navy is largely due.

The experiences obtained in ships of war by no means coincide, however, with those had in the mercantile marine. Admiral Oram gives 13.48 pounds as the weight of steam used per shaft horse-power per hour in the *Dreadnought,* which is about 15 per cent better than the results obtained with the reciprocating engines of the period. In later vessels the consumption has been reduced to a little over 12 pounds. This does not appear to be the

result obtained in our great liners. At all events, the reciprocating engine still remains in favor, and nothing is ever heard of the superior economy of the turbine—note, too, the return of the Cunard Company to the piston type in its latest ship—which could hardly be the case if the experience already obtained pointed to any substantial saving in fuel. It is possible, however, that the naval reciprocating engine is not as economical as its fellow in the merchant navy. The whole tendency is to simplify turbine-propelling machinery. The addition of separate turbines for cruising purposes has been found to be a mistake. With superheating, the experience obtained seems to be altogether unfavorable in the turbine, because of expansion and contraction. As for piston engines, even with superheats as low as 60° F., the high-pressure cylinder liners began to cut, and trials have been made by mixing superheated and ordinary steam. Admiral Oram did not mention the fact that this system was patented by Wetherhed some fifty years ago, and tried with very fair success. Superheaters cannot be used at all if salt water gets into the boilers, because the tubes suffer from rapid corrosion. But they last well with surface condensers if the make-up feed is fresh.

While referring to the difficulty of getting a high combined efficiency from the turbine and the propeller, he made no allusion to the recent schemes for the introduction of gearing or pumps between the turbine and propeller shafts. He concentrated his attention on the proposal that the turbine should drive a dynamo, and the dynamo should drive a motor on the propeller shaft. As the question stands now, he condemns the scheme very carefully, for reasons which do not seem to have suggested themselves to inventors. For example, it would be very difficult for a ship fitted with this class of machinery to keep station in maneuvers, because so far the various firms professing to make it can give only three electrical speeds, full, half and quarter, a sub-division not nearly fine enough. Again, no saving in space would be effected, and there would be an absolute loss of 12 per cent efficiency at least. It has not yet been shown that the increased efficiency due to larger diameter and slower speed of the screw would equal this, much less exceed it. Admiral Oram makes the remarkable statement that in particular cases, such as those supplied by large cruisers of the *Invincible* class, the fast running screws of the turbine have been as efficient as the slower-running screws of the piston engine. Possibly this is, after all, not saying much for the latter. He gives a final blow to the scheme by saying that it is by no means clear that room could be found under the counters of warships for screws larger than those now fitted. Mercantile practice is not much use as a guide it would seem.

He dismisses, as being for the time outside of practical politics, the use of oil or producer gas engines. A favorable estimate gives the output of gas engines and producers as one ton per 11.6 brake horse-power. But the turbine machinery and boiler of the *Indomitable* developed 13.8 shaft horse-power, and of the *Bellerophon* 13 shaft horse-power per ton. Against this is, of course, to be set an important reduction in the quantity of fuel to be carried. Admitting, however, that all other obstacles were overcome, the difficulty remains that no satisfactory gas producer has yet been devised for working with anything but anthracite, and this can only be obtained at a very few ports outside this country. Therefore, before any progress can be made with gas engines in the navy a satisfactory bituminous coal producer must be available. Furthermore, a return to crank engines will certainly not commend itself to those who are familiar with the turbine. Dealing lastly with oil fuel, Admiral Oram told his hearers that so long as spraying with air or steam was retained no satisfactory results had been obtained. Spraying was now effected by a pressure pump, and the results were quite contenting. But he added that while the total supply of mineral oil is only 3 or 4 per cent that of coal the use of oil as a fuel must remain strictly exceptional.

We congratulate Admiral Oram on his address. He certainly gave his

audience a great deal to think about. If the thinking is done on right lines and without prejudice it must do the thinkers good. There is a great deal of ability wasted by the younger members of our profession because they have nothing to guide them along the proper path. Admiral Oram has said enough to stimulate his hearers to study the present position of propelling machinery in the British Navy—a very large subject—and in some measure, at all events, to keep them from travelling on wrong roads in the pursuit of improvements.—*The Engineer.*

MISCELLANEOUS.

THE WIRELESS TELEPHONE.—The great advantage which the wire telephone would possess over the wire telegraph is not merely on account of no special technical training being required to interpret the communications through the medium of Morse code, but mainly that the tones of the speaker's voice would be reproduced in the distant receiver. The psychological effect of the voice reproduction is so powerful that mere telegraphic signaling is not in the same class with telephonic signaling. The telegraph is to the telephone as the marionette is to the living actor in dramatic production. The one is but a phantom, and the other a real presence. So, too, in wireless signaling, the range of transmission in wireless telegraphy is likely always to be greater than that in wireless telephony, and is at present much the greater; but wireless telegraphy, while it has a necessary part to play in public service, is in a class apart from wireless telephony. The former can only carry signals through space, the latter can carry personality and the force of mind. When a man uses the globe to telegraph over wirelessly, he subjects the circumambient ether to his will for enabling his ideas to be detected abroad. But when he telephones wirelessly, he extends his personal range of influence to the distance of his most remote hearer. In this sense, and to this degree, he owns that portion of the earth over which his voice is heard. The doctrine of collectivism and mutual ownership of the world has never received at the hands of the boldest communist so broad an interpretation as is spelled literally, and without reserve, by the term long-distance wireless telephony.—*Electrical World.*

A NAVAL FIRST LORD.—A correspondent of the *Daily Mail*, signing himself "Futurus," revived on Wednesday the suggestion that the First Lord of the Admiralty should be a naval officer rather than a civilian. Evidently "Futurus" has little or no knowledge of the former history of the subject with which he deals, or he would certainly have been less cocksure that the system which puts a civilian at the head of the navy is a bad one. The matter has been discussed and argued over and over again, and experience, with the great weight of naval opinion, is entirely opposed to anything of the kind. Sir John Briggs, in his "Naval Administrations, 1827-1892," deals with this question as to why an admiral should not be placed at the head of the navy, and he points out that the First Lord of the Admiralty must be a Cabinet Minister. He must also be a statesman, a finance minister, a politician and a ready debater—able to make the most of a good case and the best of a bad one. He ought also to be a patient listener and capable of weighing the arguments of both sides of a question calmly and dispassionately, and unbiassed by any professional prejudice. Above all, he must be prepared to meet with contradiction, and to have the worst interpretation put upon everything that he does, and regard it as a mere matter of course. There are a good many of these qualifications, said Sir John Briggs, which could scarcely be expected from a distinguished naval officer. On this point, too, Sir James Graham—perhaps the most able First Lord of the later nineteenth century—when questioned by the Select Committee of the House of Commons in 1861, said: "If you ask me whether I think them (naval officers) the best administrators in their mixed capacity of civil and naval servants, I am not of that opinion."—*Army and Navy Gazette.*

RECENT SUGGESTIONS OF NON-NEWTONIAN MECHANICS.—Ever since the days of Isaac Newton, both scientists and engineers have worked side by side in the firm mutual belief that the mass of a body—for instance, that of a rifle bullet—was constant, and did not vary with the velocity of the body. Not only do all the sciences of dynamics, kinematics, ballistics, etc., depend upon this condition as an essential postulate, but our whole theory of astronomy depends upon it also. Now the electronists, not content with overturning the fundamental theories of chemistry in regard to the atom, are hammering at the fundamental conceptions of length, mass and time. At this rate, if the electronists have their way, the whole basis of physical science will have to be reconstructed in thought, although the actual difference in fact will be insignificant in the vast majority of cases. Is it any wonder that respectable scientific gentlemen who have comfortably screwed down their ideas are objecting to the iconolastic proposals that the whole scheme of natural philosophy shall be revised?

It is contended by the electronists that the mass of a body, on the electronic theory, is not constant, but increases with its velocity. The change is admitted to be extremely small until the velocity approaches the velocity of light, and at this velocity the mass is claimed to become infinite. The velocity of a rifle bullet as it leaves the muzzle is so small by comparison with the velocity of light that the suggested change in the bullet's mass would be quite negligible for all practical purposes. Probably no massive body in our world ever can attain a velocity great enough to make the question practically serious. But in the vast distances of space surrounding us there should be chance for obtaining a practical test of the Newtonian *versus* the non-Newtonian theory of mass. The easiest direction in which to apply such a test is probably in that of our moon. Her velocity indeed is small, by comparison with the velocity of light, but her angular position among the stars can be observed with great precision, and errors of position due to errors in velocity accumulate with time progressively.

Now, it is admitted by all the great astronomers who have investigated the moon's motion that there is a small but distinct unexplained discrepancy between the actual and computed orbits of the moon. Whether this discrepancy is of such a direction and character as might be accounted for by the electronic theory has not been authoritatively announced as yet, and perhaps much time will be needed to review the lunar theory with reference to this question. The latest suggestion in non-Newtonian mechanics is that when a material body moves with ordinary velocity it not only undergoes an infinitesimal increase in mass, but it also undergoes an infinitesimal shrinkage of length in the direction of motion, a shrinkage that cannot be directly observed because the foot-rule applied to the moving body will also necessarily shrink during the motion. One comfort the engineer has, and that is, however greatly the physicist's ideas may have to be shaken up by physical progress in the time to come, owing to the activities of those who busy themselves with electrons, engineering is likely to go on serenely using the same formulas, rules and tables as at present, including the good old Newtonian mechanics and Ohm's law.—*Electrical World.*

Com. Gercke has an article in *Ueberall* upon recent agitation in this country, which he entitles "Messrs. Fiskin, Slurk & Co., Eatanswill." He says that Germans honor Englishmen when they read the works of Shakespeare, Scott and other great writers, not to mention Carlyle; they become their friends when they know the books of Marryat, Lever, Ainsworth, Jerome, Jacobs and others; as seamen they are more especially their admirers when they study the writings of Mahan. But he adds that it becomes painful to German readers to maintain their love for Englishmen when they read some recent articles in the English press. It is impossible not to agree with him. Bitter recriminations, expressions of animosity and ignoble slurs cast upon other people are intolerable in the commerce of nations. That there have been faults on both sides Com. Gercke will be

the first to admit, when he remembers the vilipending of this country at the time of the South African war. Let us admit, what it is impossible to deny, that Germany is as much entitled to build a fleet as we are, and let us admit also that the manner in which she has set about the work is worthy of the highest admiration. The commander recalls how Palmerston said he would treat German ships as pirates, and he cites the malicious pictures drawn by Thackeray of the Princes of Potzausend-Donnerwetter, Pumpernickel and Rouge-et-Noirburg. But how many shafts of malicious humor did not Thackeray cast at many other classes of people in his "Four Georges" and other writings? Count Wolff-Metternich spoke words brimful of wisdom the other night. Germany has her responsibilities; so have we. She has her naval standard; so have we. Let both of us do all we can for our safety, and in so doing honor one another. Com. Gercke pokes a good deal of fun at us in his article where he suggests that the canals in Mars are a device of the German Staff to find out the way to the Bank of England! He likens our election scares to the events at Eatanswill, and reproduces two of the inimitable drawings of "Phiz" to illustrate them.

In the same publication there is an article on the problem of a German invasion of England. The writer says very little about the naval aspect of the question, confining himself almost entirely to the military difficulties. He says that such an expedition could not be undertaken with a force of less than 200,000 men, and that 100,000 more would be desirable, being the equivalent of from three to five German army corps. A war with England would involve other powers, and he thinks it exceedingly doubtful whether the German War Department would sacrifice the services of such a force. "For the decisive struggle on our own frontiers we require every man and every horse." The battles that will decide the fate of Germany will be fought on the Continent, and not in any oversea expedition. He tells us that the German estimate of the tonnage of shipping required for a short voyage of a week or less is 4000 tons for a battalion, 2300 tons for a squadron or horse battery, 2000 tons for a field battery, light ammunition column or pioneer company with bridging materials, and for an ammunition column 1600 tons. He thus arrives at the estimate that an army corps, with a cavalry division and rear troops, would require 130 ships of the Norddeutcher *Frisia* class, and he pictures the immense convoy required for the transport of four corps, the time that would be occupied in adapting the ships and providing landing material and the actual places and difficulties of landing, with the time that would be needed. He remarks further that there would be no certainty of all the ships returning, and that the maintenance of communications with the home country would be vital to the success of the expedition. Such is the argument, and even if we admit that the army corps would not attempt to come with all their services, the conclusion is irresistible that the invasion of England is fraught with difficulties which are ignored by those who talk so glibly on the subject.—*Army and Navy Gazette.*

WIRELESS TELEGRAPHY.

MARCONI WIRELESS TELEGRAPHY.* By Mr. G. Marconi.—The discoveries connected with the propagation of electric waves over long distances, and the practical applications of telegraphy through space, which have gained for me the supreme honor of sharing the Nobel prize for Physics, have been to a great extent the result of one another.

The application of electric waves to the purposes of wireless telegraphic communication between distant parts of the earth, and the experiments

*Address delivered in Stockholm on December 11 by Mr. Marconi on the occasion of the awarding of his share of the Nobel prize.

which I have been fortunate enough to be able to carry out on a larger scale than is attainable in ordinary laboratories, have made it possible to investigate phenomena and note results often novel and unexpected. In my opinion many facts connected with the transmission of electric waves over great distances still await a satisfactory explanation, and I hope to be able in this lecture to refer to some observations which appear to require the attention of physicists.

In sketching the history of my association with radiotelegraphy, I might mention that I never studied physics or electrotechnics in the regular manner, although as a boy I was deeply interested in these subjects. I did, however, attend one course of lectures on Physics under the late Professor Rosa, at Livorno, and I was, I think I might say, fairly well acquainted with the publications of that time dealing with scientific subjects, including the works of Hertz, Branly and Righi. At my home near Bologna, in Italy, I commenced early in 1895 to carry out tests and experiments with the object of determining whether it would be possible by means of Hertzian waves to transmit to a distance telegraphic signs and symbols without the aid of connecting wires. After a few preliminary experiments with Hertzian waves I became very soon convinced that if these waves or similar waves could be reliably transmitted and received over considerable distances a new system of communication would become available possessing enormous advantages over flashlights and optical methods, which are so much dependent for their success on the clearness of the atmosphere.

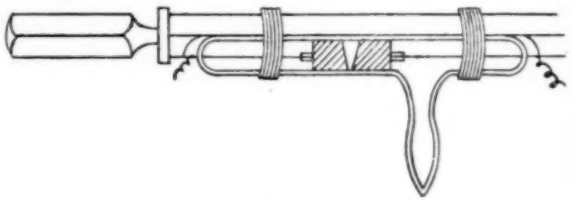


FIG. 1.

My first tests were carried out with an ordinary Hertz oscillator and a Branly coherer as detector, but I soon found out that the Branly coherer was far too erratic and unreliable for practical work.

After some experiments I found that a coherer, constructed as shown in Fig. 1, and consisting of nickel and silver filings placed in a small gap between two silver plugs in a tube, was remarkably sensitive and reliable. This improvement, together with the inclusion of the coherer in a circuit tuned to the wave-length of the transmitted radiation, allowed me gradually to extend up to about a mile the distance at which I could affect the receiver.

Another, now well-known, arrangement which I adopted was to place the coherer in a circuit containing a voltaic cell and a sensitive telegraph relay actuating another circuit, which worked a tapper or trembler and a recording instrument. By means of a Morse telegraphic key placed in one of the circuits of the oscillator or transmitter, it was possible to emit long or short successions of electric waves, which would affect the receiver at a distance and accurately reproduce the telegraphic signs transmitted through space by the oscillator. With such apparatus I was able to telegraph up to a distance of about half a mile. Some further improvements were obtained by using reflectors with both the transmitters and receivers, the transmitter being in this case a Righi oscillator. This arrangement made it possible to send signals in one definite direction, but was inoperative if hills or any large obstacle happened to intervene between the transmitter and receiver.

In August, 1895, I discovered a new arrangement which not only greatly

increased the distance over which I could communicate, but also seemed to make the transmission independent from the effects of intervening obstacles. This arrangement consisted in connecting one terminal of the Hertzian oscillator, or spark producer, to earth, and the other terminal to a wire or capacity area placed at a height above the ground, and in also connecting at the receiving end one terminal of the coherer to earth and the other to an elevated conductor.—Figs. 2 and 3. I then began to examine the relation between the distance at which the transmitter could affect the receiver, and the elevation of the capacity areas above the earth, and I very soon definitely ascertained that the higher the wires or capacity areas the greater the distance over which it was possible to telegraph.

Thus I found that when using cubes of tin about 30 cm. side as elevated conductors or capacities, placed at the top of poles 2 m. high, I could receive signals at 30 m. distance, and when placed on poles 4 m. high at 100 m., and at 8 m. high at 400 m. With larger cubes 100 cm. side, fixed at a height of 8 m., signals could be transmitted 2400 m. all around.[1] These

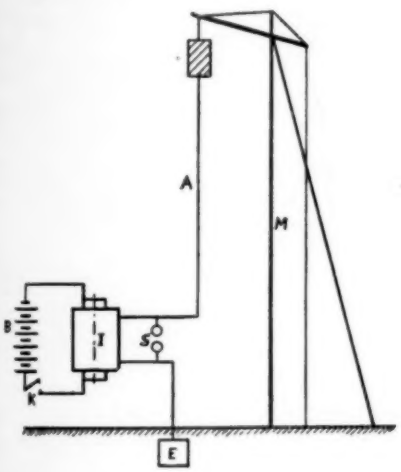


FIG. 2.

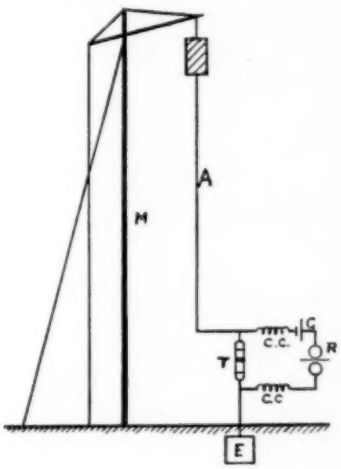


FIG. 3.

experiments were continued in England, where, in September, 1896, a distance of 1¾ miles was obtained in tests carried out for the British Government at Salisbury. The distance of communication was extended to four miles in March, 1897, and in May of the same year to nine miles. Tape messages obtained during these tests, signed by the British Government officers who were present, are exhibited. In all these experiments a very small amount of electrical power was used, the high-tension current being produced by an ordinary Rhumkoff coil. The results obtained attracted a good deal of public attention at the time, such distances of communication being considered remarkable.

As I have explained, the main feature in my system consisted in the use of elevated capacity areas, or vertical wires, attached to one pole of the high-frequency oscillators and receivers, the other pole of which was earthed. The practical value of this innovation was not understood by many physicists for quite a considerable period, and the results which I obtained were

[1] See "Journal" of the Institution of Electrical Engineers, London, 1899. Vol. XXVIII, page 278.

by many erroneously considered simply due to efficiency in details of construction of the receiver, and to the employment of a large amount of energy. Others did not overlook the fact that a radical change had been introduced by making these elevated capacities and the earth form part of the high-frequency oscillators and receivers. Professor Ascoli, of Rome, gave a very interesting theory of the mode of operation of my transmitters and receivers in the *Elettricista* (Rome) issue of August, 1897, in which he correctly attributed the results obtained to the use of elevated wires or antennæ. Professor A. Slaby, of Charlottenburg, after witnessing my tests in England in 1897, came to somewhat similar conclusions.[2]

Many technical writers have stated that an elevated capacity at the top of the vertical wire is unnecessary. This is true if the length or height of the wire is made sufficiently great, but as this height may be much smaller for a given distance if a capacity area is used, it is more economical to use such capacities, which now usually consist of a number of wires spreading out from the top of the vertical conductor.

The necessity or utility of the earth connection has been sometimes questioned, but in my opinion no practical system of wireless telegraphy

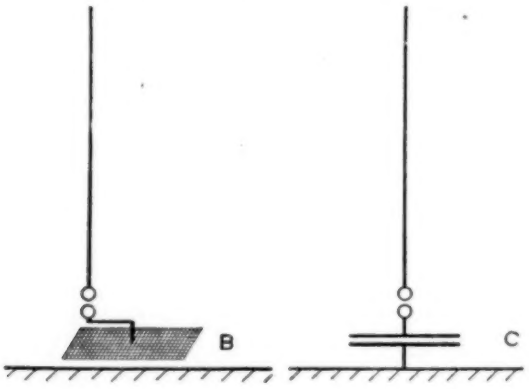


FIG. 4.

exists where the instruments are not connected to earth. By "connecting to earth" I do not necessarily mean an ordinary metallic connection as used for ordinary wire telegraphs. The earth wire may have a condenser in series with it, or it may be connected to what is really equivalent, a capacity area placed close to the surface of the ground—Fig. 4. It is now perfectly well known that a condenser, if large enough, does not prevent the passage of high-frequency oscillations, and therefore in these cases the earth is for all practical purposes connected to the antennæ. After numerous tests and demonstrations in Italy and in England over distances varying up to 40 miles, communication was established for the first time across the English Channel between England and France in March, 1899.[3] (Fig. 5.)

From the beginning of 1898 I had practically abandoned the system of connection shown in Fig. 2, and instead of joining the coherer or detector directly to the aerial and earth, I connected it between the ends of the

[2] See A. Slaby, "Die Funkentelegraphie," Berlin, 1897, Verlag von Bronhard Simion; also A. Slaby, "The New Telegraphy," the *Century Magazine*, April, 1898, Vol. LV, page 867.

[3] See "Journal" of the Institution of Electrical Engineers, 1899, London, Vol. XXVIII, page 291.

secondary of a suitable oscillation transformer containing a condenser and tuned to the period of the electrical waves received. The primary of this oscillation transformer was connected to the elevated wire and to earth—Fig. 6. This arrangement allowed of a certain degree of syntony, as by varying the period of oscillation of the transmitting antennæ it was possible to send messages to a tuned receiver without interfering with others differently syntonized.[4]

As it is now well known, a transmitter consisting of a vertical wire discharging through a spark gap is not a persistent oscillator; the radiation it produces is strongly damped. Its electrical capacity is comparatively so small and its capability of radiating energy so large that its oscillations decrease or die off with great rapidity. In this case receivers or resonators of a considerably different period or pitch are likely to be affected by it.

FIG. 5.

Early in 1899 I was able to improve the resonance effects obtainable by increasing the capacity of the elevated wires by placing adjacently to them earthed conductors, and inserting in series with the aerials suitable inductance coils.[4] By these means the energy storing capacity of the aerial was increased, whilst its capability to radiate was decreased, with the result that the energy set in motion by the discharge formed a train or succession of feebly damped oscillations. A modification of this arrangement, by which excellent results were obtained, is shown in Fig. 7.

In 1900 I constructed and patented transmitters which consisted of the usual kind of elevated capacity area and earth connection, but these were

[4] British Patent No. 12,326 of June 1, 1898; also No. 6982 of April 1, 1899.

[5] See "Etat Actuel et Progres de la Telegraphie sans Fil," by A. Blondel and G. Ferrie, read at the Congres International d'Electricite, Paris, 1900; also "Journal" of the Society of Arts, 1901, Vol. XLIX, page 509.

inductively coupled to an oscillation circuit containing a condenser, an inductance and a spark gap, the conditions which I found essential for efficiency being that the periods of electrical oscillation of the elevated wire or conductor should be in time or resonance with that of the condenser circuit—Fig. 8.* The circuits, consisting of the oscillating circuit and radiating circuit, were more or less closely "coupled" by varying the distance between them. By the adjustment of the inductance inserted in the elevated conductor and by the variation of the capacity of the condenser circuit the two circuits were brought into resonance, a condition which, as I have said, I found essential in order to obtain efficient radiation.

Part of my work regarding the utilization of condenser circuits in association with the radiating antennæ was carried out simultaneously to that

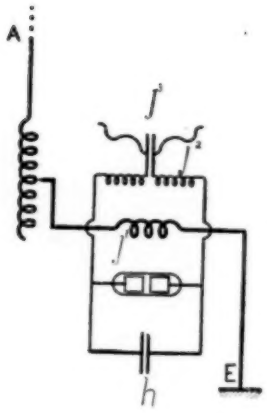


FIG. 6.

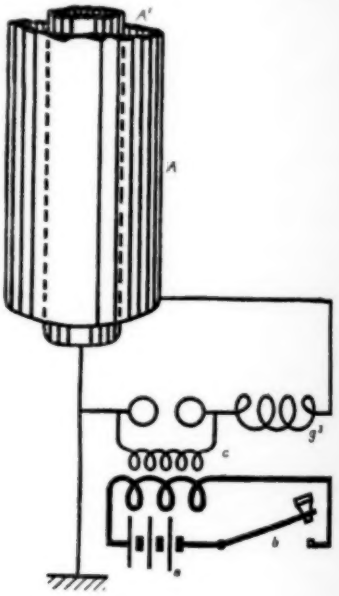


FIG. 7.

of Professor Braun, without, however, either of us knowing at the time anything of the contemporary work of the other.

A syntonic receiver has already been shown in Fig. 6, and consists also of a vertical conductor or aerial, connected to earth through the primary of an oscillation transformer, the secondary circuit of which included a condenser and a detector, it being necessary that the circuit containing the aerial and the circuit containing the detector should be in electrical resonance with each other, and also in tune with the periodicity of the electric waves transmitted from the sending station. It is also possible to couple to one sending conductor several differently tuned transmitters, and to a receiving wire a number of corresponding receivers, as is shown in Figs. 9 and 10, each individual receiver responding only to the radiations of the transmitter with which it is in resonance.

* See British Patent No. 7777 of April 26, 1900; also "Journal" of the Society of Arts, Vol. XLIX, May 17, 1901, pages 510-511.

At the time (twelve years ago) when communication was first established by means of radiotelegraphy between England and France, much discussion and speculation took place as to whether or not wireless telegraphy would be practicable for much longer distances than those then covered, and a somewhat general opinion prevailed that the curvature of the earth would be an insurmountable obstacle to long-distance transmission, in the same way as it was, and is, an obstacle to signalling over considerable distances by means of light flashes. Difficulties were also anticipated as to the possibility of being able to control the large amount of energy which it appeared would be necessary to cover long distances. What often happens in pioneer work repeated itself in the case of radiotelegraphy—the anticipated obstacles or difficulties were either purely imaginary or else easily surmountable, but in their place unexpected barriers

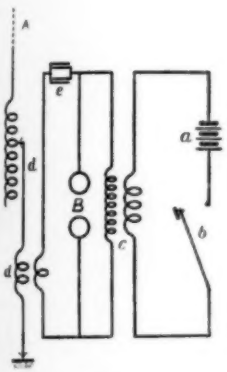


FIG. 8.

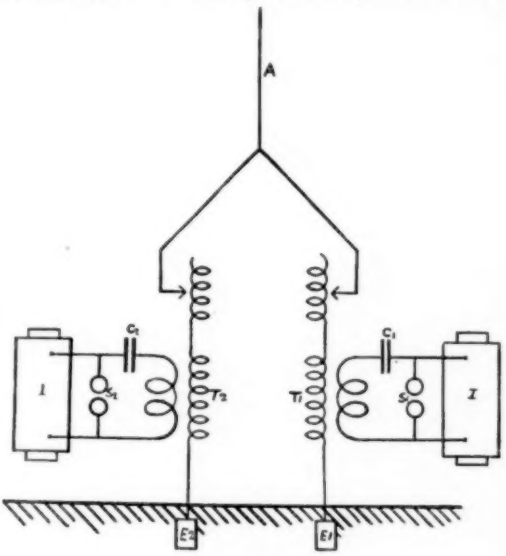


FIG. 9.

manifested themselves, and recent work has been mainly directed to the solution of problems presented by difficulties which were certainly neither expected nor anticipated when long distances were first attempted.

With regard to the presumed obstacle of the curvature of the earth, I am of opinion that those who anticipated difficulties in consequence of the shape of our planet had not taken sufficient account of the particular effect of the earth connection to both transmitter and receiver, which earth connection introduced effects of conduction which were generally at that time overlooked. Physicists seemed to consider for a long time that wireless telegraphy was solely dependent on the effects of free Hertzian radiation through space, and it was years before the probable effect of the conductivity of the earth between the stations was satisfactorily considered or discussed.

Lord Rayleigh, in referring to transatlantic telegraphy, stated, in May, 1903: "The remarkable success of Marconi in signalling across the Atlantic suggests a more decided bending or diffraction of the waves round the protuberant earth than had been expected, and it imparts a great interest to the theoretical problem."[1]

[1] See "Proceedings" of the Royal Society, Vol. 72, May 28, 1903.

Professor J. A. Fleming, in his book on "The Principles of Electric Wave Telegraphy,"[8] gives diagrams showing what is now believed to be the diagrammatic representation of the detachment of semi-loops of electric strain from a simple vertical wire—Fig. 11. As will be seen, these waves do not propagate in the same manner as free radiation from a

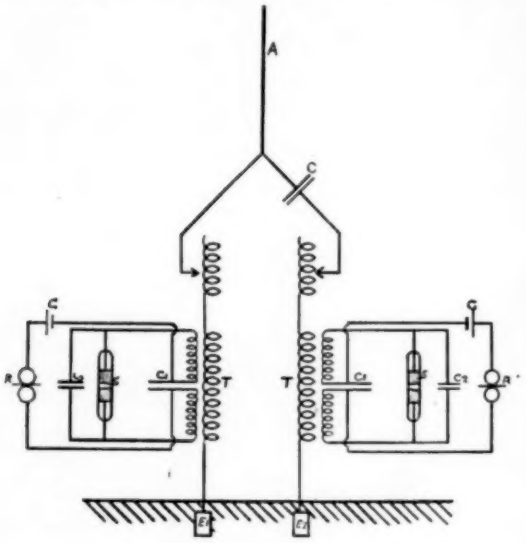


FIG. 10.

classical Hertzian oscillator, but glide along the surface of the earth. Professor Fleming further states in the above-quoted work: "The view we here take is that the ends of the semi-loops of electric force, which terminate perpendicularly on the earth, cannot move along unless there are movements of electrons in the earth corresponding to the wave-motions above it. From the point of view of the electronic theory of electricity,

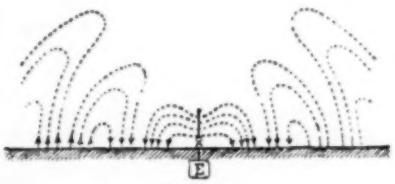


FIG. 11.

every line of electric force in the ether must be either a closed line or its ends must terminate on electrons of opposite sign. If the end of a line of strain abuts on the earth and moves, there must be atom-to-atom exchange of electrons, or movements of electrons in it. We have many reasons for concluding that the substances we call conductors are those in which free movements of electrons can take place. Hence the movements of the

[8] See page 348 (published by Longmans, Green & Co., London, 1906).

semi-loops of electric force outwards from an earthed oscillator or Marconi Aërial is hindered by bad conductivity on the surface of the earth and facilitated over the surface of a fairly good electrolyte, such as sea water."

Professor Zenneck[9] has carefully examined the effect of earthed transmitting and receiving aerials, and has endeavored to show mathematically that when the lines of electrical force, constituting a wave front, pass along a surface of low specific inductive capacity, such as the earth, they become inclined forward, their lower ends being retarded by the resistance of the conductor to which they are attached. It therefore seems well established that wireless telegraphy, as practised at the present day, is dependent for its conductivity of the earth, and that the difference in operation over long distances on the conductivity between the surface of the sea and land is sufficient to explain the increased distance obtainable with the same amount of energy in communicating over sea as compared to over land.

I carried out some tests between a shore station and a ship at Poole, in England, in 1902, for the purpose of obtaining some data on this point, and I noticed that at equal distances a perceptible diminution in the energy of

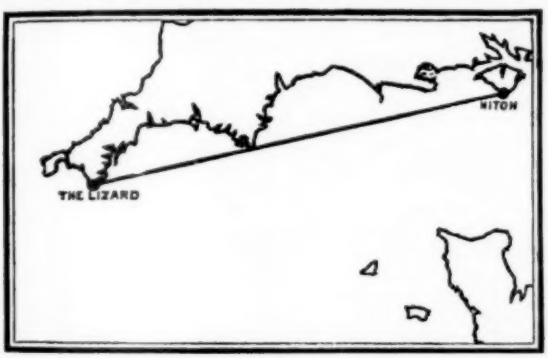


FIG. 12.

the received waves always occurred when the ship was in such a position as to allow a low spit of sand about 1 k. broad to intervene between it and the land station. I therefore believe that there was some foundation for the statement so often criticised which I made in my first English patent of June 2, 1896, to the effect that when transmitting through the earth or water I connected one end of the transmitter and one end of the receiver to earth.

In January, 1901, some successful experiments were carried out between two points on the south coast of England 186 miles apart, *i. e.*, St. Catherine's Point, Isle of Wight, and the Lizard in Cornwall[10]—Fig. 12. The total height of these stations above sea level did not exceed 100 m., whereas to clear the curvature of earth a height of more than 1600 m. at each end would have been necessary. The results obtained from these tests, which at the time constituted a record distance, seemed to indicate that electric waves produced in the manner I had adopted would most probably be able to make their way round the curvature of the earth, and that therefore even at greater distances, such as those dividing America from Europe, the factor of the earth's curvature would not constitute an insurmountable barrier to the extension of telegraphy through space.

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[10] See "Journal" of the Society of Arts, London, Vol. XLIX, page 512, 1901.

[9] See J. Zenneck, "Annalen der Physik.," 23, 5, page 846, September, 1908. "Physikal Zeitschrift," No. 2, page 50; No. 17, page 553.

The belief that the curvature of the earth would not stop the propagation of the waves, and the success obtained by syntonic methods in preventing mutual interference, led me in 1900 to decide to attempt the experiment of testing whether or not it would be possible to detect electric waves over a distance of 4000 k., which, if successful, would immediately prove the possibility of telegraphing without wires between Europe and America. The experiment was, in my opinion, of great importance from a scientific point of view, and I was convinced that the discovery of the possibility to transmit electric waves across the Atlantic Ocean, and the exact knowledge of the real conditions under which telegraphy over such distances could be carried out, would do much to improve our understanding of the phenomena connected with wireless transmission. The transmitter erected at Poldhu, on the coast of Cornwall, was similar in principle to the one I have already referred to, but on a very much larger scale than anything previously attempted.[11] The power of the generating plant was about 25 kilowatts.

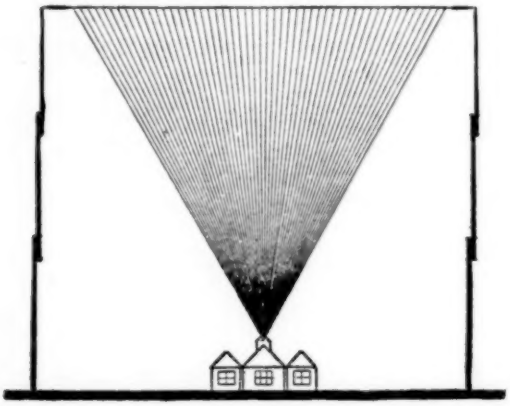

FIG. 13.

Numerous difficulties were encountered in producing and controlling for the first time electrical oscillations of such power. In much of the work I obtained valuable assistance from Professor J. A. Fleming, Mr. R. N. Vyvyan, and Mr. W. S. Entwistle. My previous tests had convinced me that when endeavoring to extend the distance of communication, it was not merely sufficient to augment the power of the electrical energy of the sender, but that it was also necessary to increase the area or height of the transmitting and receiving elevated conductors. As it would have been too expensive to employ vertical wires of great height, I decided to increase their number and capacity, which seemed likely to make possible the efficient utilization of large amounts of energy. The arrangement of transmitting antennæ which was used at Poldhu is shown in Fig. 13, and consisted of a fan-like arrangement of wires supported by an insulated stay between masts only 48 m. high and 60 m. apart. These wires converged together at the lower end, and were connected to the transmitting apparatus contained in a building.

For the purpose of the test, a powerful station had been erected at Cape Cod, near New York, but the completion of the arrangements at that station were delayed in consequence of a storm, which destroyed the masts and antennæ. I therefore decided to try the experiments by means of a

[11] Royal Institution of Great Britain, Lecture by G. Marconi, June 13, 1902.

temporary receiving station erected in Newfoundland, to which country I proceeded with two assistants about the end of November, 1901.

The tests were commenced early in December, 1901, and on the 12th of that month the signals transmitted from England were clearly and distinctly

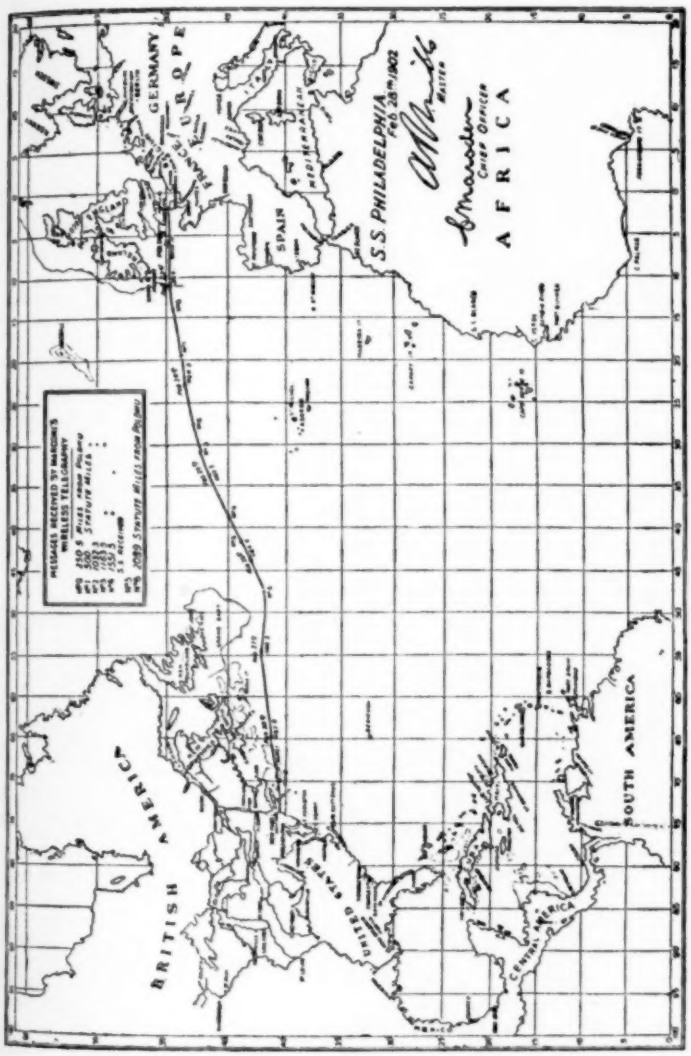

FIG. 14.

received at the temporary station at St. John's, in Newfoundland. Confirmatory tests were carried out in February, 1902, between Poldhu and a receiving station on the steamship *Philadelphia*, of the American Line. On board this ship readable messages were received by means of a recording instrument up to a distance of 1551 miles, and test letters as far as 2099 miles from Poldhu—Fig. 14.

The tape records obtained on the *Philadelphia* at the various distances were exceedingly clear and distinct, as can be seen by the specimens exhibited.

These results, although achieved with imperfect apparatus, were sufficient to convince me and my co-workers that by means of permanent stations and the employment of sufficient power it would be possible to transmit messages across the Atlantic Ocean in the same way as they were sent over much shorter distances. The tests could not be continued in Newfoundland owing to the hostility of a cable company, which claimed all rights for telegraphy, whether wireless or otherwise, in that colony.

A result of scientific interest which I first noticed during the tests on the steamship *Philadelphia*, and which is a most important factor in long-distance radiotelegraphy, was the very marked and detrimental effect of daylight on the propagation of electric waves at great distances; the range by night being usually more than double that attainable during daytime.[12] I do not think that this effect has yet been satisfactorily investigated or explained. At the time I carried out the tests I was of opinion that it might be due to the loss of energy at the transmitter, caused by the dis-electrification of the highly-charged transmitting elevated conductor under the influence of sunlight.

FIG. 15.

I am now inclined to believe that the absorption of electric waves during the daytime is due to the ionization of the gaseous molecules of the air affected by ultra-violet light, and as the ultra-violet rays, which emanate from the sun, are largely absorbed in the upper atmosphere of the earth, it is probable that the proportion of the earth's atmosphere which is facing the sun will contain more ions or electrons than that portion which is in darkness, and therefore, as Sir J. J. Thomson has shown,[13] this illuminated and ionized air will absorb some of the energy of the electric waves. Apparently, the length of wave and altitude of electrical oscillations have much to do with this interesting phenomenon, long waves and small amplitudes being subject to the effect of daylight to a much lesser degree than short waves and large amplitudes. According to Professor Fleming, the daylight effect should be more marked on long waves, but this has not been my experience. Indeed, in some very recent experi-

[12] See Proceedings of the Royal Society, Vol. LXX, "A Note on the Effect of Daylight upon the Propagation of Electromagnetic Impulses," G. Marconi, June 12, 1902.

[13] See *Philosophical Magazine*, August, 1902, Ser. 6, Vol. IV, page 253. J. J. Thomson, "On some Consequences, etc."

ments, in which waves about 8000 m. long were used, the energy received by day was usually greater than at night. The fact remains, however, that for comparatively short waves, such as are used for ship communication, clear sunlight and blue skies, though transparent to light, act as a kind of fog to these waves. Hence, the weather conditions prevailing in England, and perhaps in this country (Sweden), are usually suitable for wireless telegraphy.

During the year 1902 I carried out some further tests between the station at Poldhu and a receiving installation erected on the Italian cruiser *Carlo Alberto*, kindly placed at my disposal by H. M. the King of Italy.[11] During

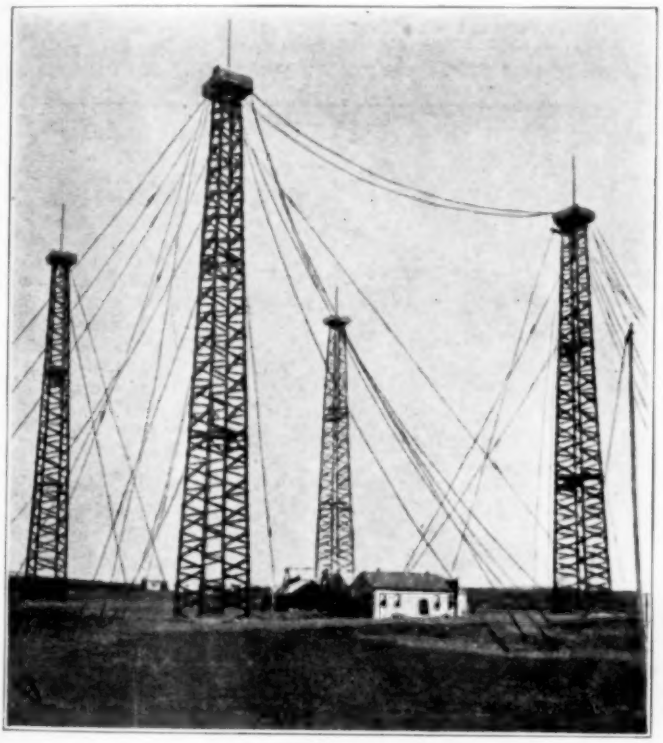

FIG. 16.

these experiments the interesting fact was observed that even when using waves as short as 1000 feet, intervening ranges of mountains, such as the Alps or Pyrenees, did not, during the night time, bring about any considerable reduction in the distance over which it was possible to communicate. During daytime, unless much longer waves and more power were used, intervening mountains greatly reduced the apparent range of the transmitter. Messages and press despatches of considerable length were received from Poldhu at the positions marked on the map, which map is a copy on a reduced scale of the one accompanying the official report of the experiments—Fig. 15.

[11] See "Revista Marittima," Rome, October, 1902.

With the active encouragement and financial assistance of the Canadian Government, a high-power station was constructed at Glace Bay, Nova Scotia, in order that I should be able to continue my long-distance tests with a view to establishing radiotelegraphic communication on a commercial basis between England and America.[12] On December 16, 1902, the first official messages were exchanged at night across the Atlantic, between the stations at Poldhu and Glace Bay—Figs. 16 and 17. Further tests were shortly afterwards carried out with another long distance station at Cape Cod in the United States of America, and under favorable circumstances it was found possible to transmit messages to Poldhu, 3000 miles away, with an expenditure of electrical energy of only about 10 kilowatts.

In the spring of 1903 the transmission of press messages by radiotelegraphy from America to Europe was attempted, and for a time the London *Times* published, during the latter part of March and the early part of April of that year, news messages from its New York correspon-

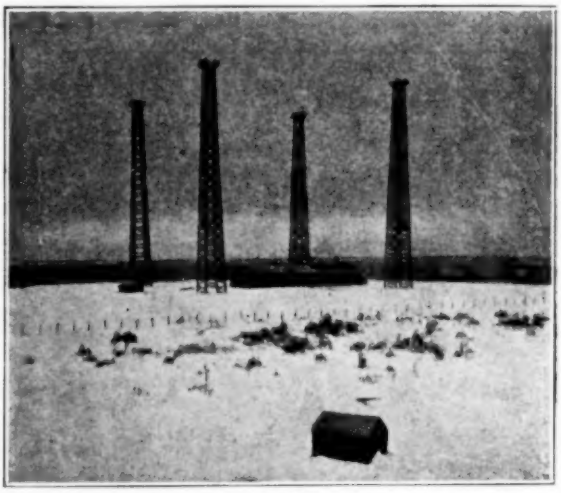

FIG. 17.

dent sent across the Atlantic without the aid of cables. A breakdown in the insulation of the apparatus at Glace Bay made it necessary, however, to suspend the service, and unfortunately further accidents made the transmission of messages uncertain and unreliable. As a result of the data and experience gained by these and other tests which I carried out for the British Government, between England and Gibraltar, I was able to erect a new station at Clifden in Ireland, and enlarge the one at Glace Bay in Canada, so as to enable me to initiate, in October, 1907, communication for commercial purposes across the Atlantic between England and Canada. Although the stations at Clifden and Glace Bay had to be put into operation before they were altogether complete, nevertheless communication across the Atlantic by radiotelegraphy never suffered any serious interruption during nearly two years until, in consequence of a fire at Glace Bay this autumn, it has had to be suspended for three or four months. This suspension has not, however, been altogether an unmitigated evil, as it has given me the opportunity of installing more efficient and up-to-date machinery.

[12] See paper read before the Royal Institution of Great Britain by G. Marconi, March 3, 1905.

The arrangements of elevated conductors or aerials which I have tried during my long-distance tests are shown in Figs. 18, 19 and 20.[18] The aerial, shown in Fig. 20, consisted of a nearly vertical portion in the middle,

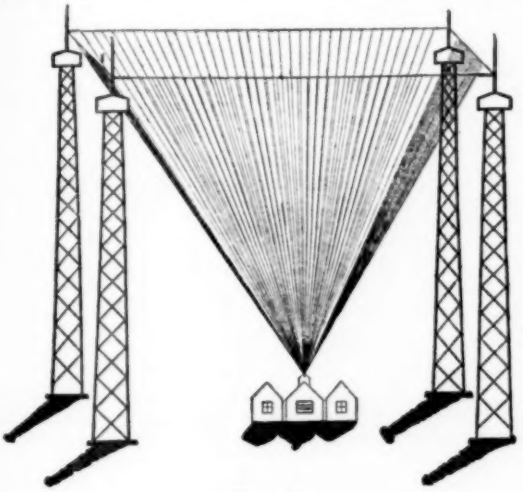

FIG. 18.

220 feet high, supported by four towers, and attached at the top to nearly horizontal wires, 200 in number and each 1000 feet long, extending radially all round, and supported at a height of 180 feet from the ground by an

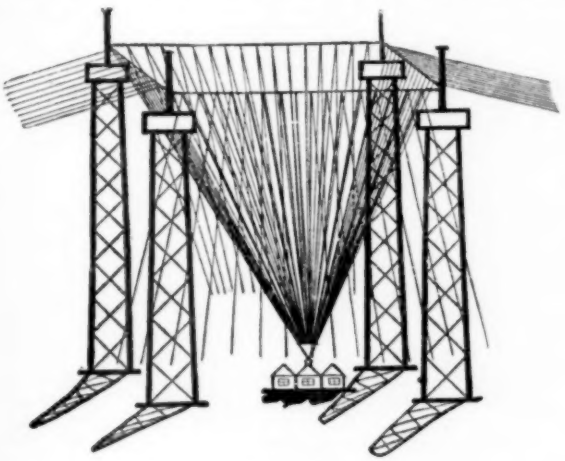

FIG. 19.

inner circle of 8, and an outer circle of 16, masts. The natural period of oscillation of this aerial system gave a wave length of 12,000 feet. Experi-

[18] See also lecture before the Royal Institution of Great Britain by G. Marconi, March 13, 1908.

ments were made with this arrangement in 1905, and with a wave length of 12,000 feet, signals, although very weak, could be received across the Atlantic by day as well as by night. The system of aerial I finally adopted for the long-distance stations in England and Canada is shown in Fig. 21. This arrangement not only makes it possible efficiently to radiate and receive waves of any desired length, but it also tends to confine the main portion of the radiation to a given direction. The limitation of transmission to one direction is not very sharply defined, but the results obtained with this type of aerial are nevertheless exceedingly useful.

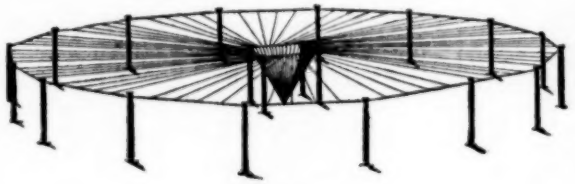

FIG. 20.

Many suggestions respecting methods for limiting the direction of radiation have been made by various workers, notably by Professor F. Braun, Professor Artom and Messrs. Bellini and Tosi. In a paper read before the Royal Society in London in March, 1906,[17] I showed how it was possible by means of horizontal aerials to confine the emitted radiations mainly to the direction of their vertical plane, pointing away from their earthed end. In a similar manner it is possible to locate the bearing or direction of a sending station. The transmitting circuits at the long distance stations are arranged in accordance with a comparatively recent system for producing continuous or slightly damped oscillations, which I referred to in a lecture before the Royal Institution of Great Britain on March 13, 1908. An insulated metal disc *A*—Fig. 22—is caused to rotate at a high rate of

FIG. 21.

speed by means of an electric motor or steam turbine. Adjacent to this disc, which I will call the middle disc, are placed two other discs *C'* and *C''*, which may be called polar discs, and which are also revolved. These polar discs have their peripheries very close to the surface or edges of the middle disc. The two polar discs are connected by rubbing contacts to the outer ends of two condensers *K*, joined in series, and these condensers are also connected through suitable brushes to the terminals of generator, which should be a high-tension continuous current generator. On the middle disc a suitable brush or rubbing contact is provided, and between this contact and the middle point of the two condensers an oscillating circuit is inserted, consisting of a condenser *E* in series with an inductance, which last is inductively connected with the radiating antennæ. The apparatus works probably in the following manner: The generator charges the double condenser, making the potential of the discs, say, *C'* positive and *C''* negative. The potential, if high enough will cause a discharge to pass

[17] "On Methods whereby the Radiation of Electric Waves may be Mainly Confined, etc." "Proceedings" of the Royal Society, A Vol., 77, 1906.

across one of the gaps, say, between C' and A. This charges the condenser E through the inductance F, and starts oscillations in the circuit. The charge of F in swinging back will jump from A to C'', the potential of which is of opposite sign to A, the dielectric strength between C' and A having meanwhile been restored by the rapid motion of the disc, driving away the ionized air. The condenser E therefore discharges and recharges

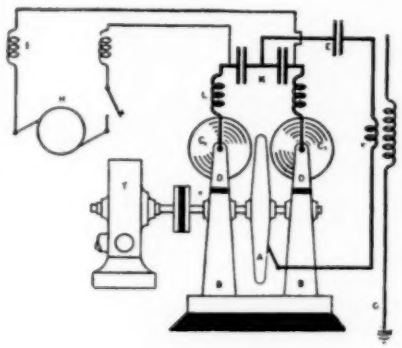

FIG. 22.

alternately in reverse directions, the same process going on so long as energy is supplied to the condensers K by the generator H. It is clear that the discharges between C' and C'' and A are never simultaneous, as otherwise the center electrode would not be alternately positive and negative.

The best results have, however, been obtained by an arrangement, as shown in Fig. 23, in which the active surface of the middle disc is not

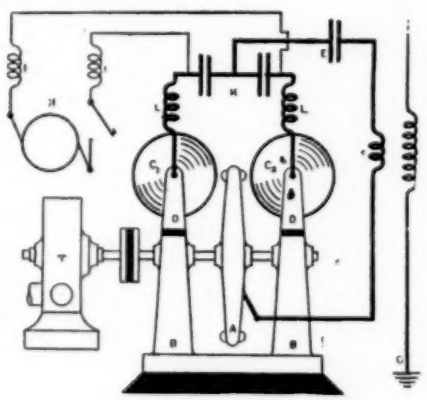

FIG. 23.

smooth, but consists of a number of regularly spaced copper knobs or pegs, at the ends of which the discharges take place at regular intervals. In this way it is possible to cause the groups of oscillations radiated to reproduce a high and clear musical note in a receiver, and thereby it is easier to differentiate between the signals emanating from the sending station and noises caused by atmospheric electrical discharges. By this method very efficient resonance can be also obtained in appropriately designed receivers.

With regard to the receivers employed, important changes have taken place. By far the larger portion of electric wave telegraphy was, until a few years ago, conducted by means of some form or other of coherer, or variable contact either requiring tapping or self-restoring. At the present day, however, I may say that in all the stations controlled by my company my magnetic receiver is almost exclusively employed—Fig. 24.[18] This receiver is based on the decrease of magnetic hysterises which occur in iron when under certain conditions this metal is subjected to the effects of electrical waves of high frequency. It has recently been found possible to increase the sensitiveness of these receivers, and to employ them in connection with a high-speed relay, so as to record messages at great speed.

A remarkable fact, not generally known, in regard to transmitters is that none of the arrangements employing condensers exceed in efficiency the plain elevated aerial or vertical wire discharging to earth through a spark gap, as used in my first experiments—Figs. 2 and 3 (*ante*). I have recently been able to confirm the statement made by Professor Fleming in his book, "The Principles of Electric Wave Telegraphy," 1906, page 555, that with a power of 8 watts in the aerial it is possible to communicate to

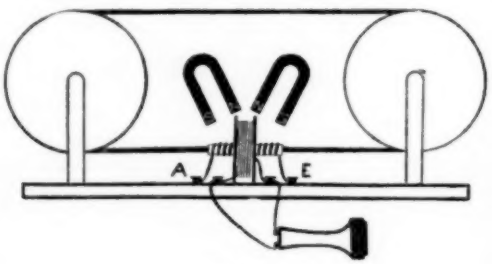

FIG. 24.

distances of over 100 miles. I have also found that by this method it is possible to send signals 2000 miles across the Atlantic with a smaller expenditure of energy than by any other method known to myself.

The only drawback to this arrangement is that unless very large aerials are used, the amount of energy which can be efficiently employed is limited by the potential, beyond which brush discharges and the resistances of the spark gap begin to have a deleterious effect. By means of spark gaps in compressed air and the addition of inductance coils placed between the aerial and earth, the system can be made to radiate very pure and slightly damped waves, eminently suitable for sharp tuning. In regard to the general working of wireless telegraphy, the widespread application of the system and the multiplicity of the stations have greatly facilitated the observation of facts not easily explainable. Thus it has been observed that an ordinary ship station utilizing about half a kilowatt of electrical energy, the normal range of which is not greater than 200 miles, will occasionally transmit messages across a distance of over 1200 miles. It often occurs that a ship fails to communicate with a nearby station, but can correspond with perfect ease with a distant one.

On many occasions last winter the steamship *Caronia*, of the Cunard Line, carrying a station utilizing about half a kilowatt, when in the Mediterranean off the coast of Sicily, failed to obtain communication with the Italian stations, but had no difficulty whatsoever in transmitting and receiving messages to and from the coasts of England and Holland, although

[18] "Proceedings" of the Royal Society. "Note on a Magnetic Detector of Electric Waves." G. Marconi, Vol. LXX, 1902, page 341.

these latter stations were considerably more than 1000 miles away and a large part of the Continent of Europe and the Alps lay between them and the ship.

Although high power stations are now used for communicating across the Atlantic, and messages can be sent by day as well as by night, there still exist short periods of daily occurrence during which transmission from England to America, or *vice versa*, is difficult. Thus, in the morning and evening, when, in consequence of the difference in longitude, daylight or darkness extends only part of the way across the ocean, the received signals are weak, and sometimes cease altogether. It would almost appear as if electric waves, in passing from dark space to illuminated space, and *vice versa*, were reflected in such a manner as to be diverted from their normal path. It is probable that these difficulties would not be experienced in telegraphing over equal distances north and south, on about the same meridian, as in this case the passage from daylight to darkness would occur almost simultaneously over the whole distance between the two points.

Another curious result, on which hundreds of observations continued for years leave no further doubt, is that regularly, for short periods, at sunrise and sunset, and occasionally at other times, a shorter wave can be detected across the Atlantic in preference to the longer wave normally employed. Thus, at Clifden and Glace Bay, when sending on an ordinary coupled circuit arranged so as simultaneously to radiate two waves, one 12,500 feet and the other 14,700 feet, although the longer wave is the one usually received at the other side of the ocean, regularly about three hours after sunset at Clifden and three hours before sunrise at Glace Bay the shorter wave alone was received with remarkable strength, for a period of about one hour. This effect occurred so regularly that the operators tuned their receivers to the shorter wave at the times mentioned as a matter of ordinary routine.

With regard to the utility of wireless telegraphy, there is no doubt that its use has become a necessity for the safety of shipping, all the principal liners and warships being already equipped, its extension to less important ships being only a matter time, in view of the assistance it has provided in cases of danger. Its application is also increasing as a means of communicating between outlying islands, and also for the ordinary purposes of telegraphic communication between villages and towns, especially in the colonies and in newly developed countries. However great may be the importance of wireless telegraphy to ships and shipping, I believe it is destined to an equal position of importance in furnishing efficient and economical communication between distant parts of the world, and in connecting European countries with their colonies and with America. As a matter of fact, I am at the present time erecting a very large power station for the Italian Government at Coltano, for the purpose of communicating with the Italian colonies in East Africa, and with South America.

Whatever may be its present shortcomings and defects, there can be no doubt that wireless telegraphy even over great distances has come to stay, and will not only stay, but continue to advance. If it should become possible to transmit waves right round the world, it may be found that the electrical energy travelling round all parts of the globe may be made to concentrate at the antipodes of the sending station. In this way it may some day be possible for messages to be sent to such distant lands by means of a very small amount of electrical energy, and therefore at a correspondingly small expense. But I am leaving the regions of fact, and entering the regions of speculation, which, however, with the knowledge we have gradually gained on the subject, promise results both useful and instructive.

BOOK NOTICES.

"Altitude and Azimuth Tables." By Lieutenant Radler de Aquino, Brazilian Navy.

After a careful examination of this book and of the methods given for the solution of the astronomical triangle there can be no doubt of its practicability and of its claim, "The simplest and readiest in solution."

In the solution of the line of position for the sun, which is by far the most common of all sights, and employing all figures to get functions as closely as given in the Nautical Almanac, which in practice is not necessary, a comparison of the two methods is as follows:

	Figures.	Book openings.	Time.
Common to both.....	177	8	$9^m\ 30^s$
Peculiar to each..... 101 Aquino		2	4^m
Peculiar to each..... 138 St. Hilaire		9	$7^m\ 30^s$

Upon examination of the above table it can be immediately seen how much quicker in solution the Aquino is. In point of accuracy of results within the limits of 70° declination, and taking into consideration the errors of observation, there is no choice. There is less chance of making errors in working on account of the fact that only four functions have to be picked out accurately from the tables, whereas in the St. Hilaire eight have to be found. In comparing the two methods the part common to both is not considered.

In the case of the meridian altitudes the ordinary method of combining the zenith distance and declination is better than the method shown in this book, on account of it being necessary to remember one precept instead of four.

The method of finding latitude from a sight of Polaris presents no advantages over that given in the back of the Nautical Almanac for the current year, and has less advantage over that given in the Almanac of 1912.

The determination of the line of position without azimuths is to be commended and, if the altitude is to be determined by the tables of this book, is of great value.

The necessity of the rectification of lines of position occurs very rarely in practice, but when it does happen this method is an excellent one.

The identification of celestial bodies and the finding of the approximate altitude and azimuth before taking a sight are, under the present great interest in the use of stars for navigational purposes, of great value, and when the tables are once thoroughly understood, very easy to find.

Azimuths can be determined with ease and necessary accuracy by means of these tables.

The use of these to find the Great Circle Course is not recommended. Lunar distances have been abandoned by navigators.

Taken as a whole, this book cannot be too highly recommended, and all navigators should possess a copy. It is to be hoped that the author will publish the larger book he is making out for his own use.

G. R. MARVELL.

"Commodore John Rodgers: Captain, Commodore, and Senior Officer of the American Navy, 1773-1838." A biography by Charles Oscar Paullin, author of the "Navy of the American Revolution," the "Administration of the Continental Navy of the American Revolution," etc., with bibliography, analytical index, and numerous portraits, facsimiles, and early views of war-vessels, buildings, etc. Handsomely printed in large and clear type on the beautiful Alexandria hand-made paper, deckled edges. One large volume, 8vo. (about 450 pages), cloth, uncut, gilt top. Price $4.00 net. Issued in a limited edition, printed direct from the type and the type distributed.

This biography, the only one extant, constitutes in no small measure a history of the American Navy during his years of service, 1798 to 1838, and contains much very important historical material relating to this period, chiefly from unpublished manuscripts and scarce documents. It also constitutes perhaps the most graphic account of the old navy, 1794 to 1855, with much valuable and picturesque information relating to the ships, officers, and seamen. Rodgers commanded such historic fighting vessels as the *Insurgente, Chesapeake, President,* and *Guerrière.* As senior officer and president of the board of naval commissioners for nearly 20 years, he established naval asylums at Philadelphia, Chelsea, Norfolk, Pensacola, and New York City; improved the naval yards of Boston; built the first vessel of our steam navy, a gun boat of Jefferson's famous flotilla; established a depot of Charts and Instruments, out of which came our present Naval Observatory and Hydrographic Office; advocated for many years, planned, and later secured the Naval Academy at Annapolis. His plans for systematizing naval practices resulted in a code of regulations which form the basis of our present system and bear directly upon naval administration problems of to-day and the proposed reorganization of the Navy Department.

He participated in the wars with France, the Barbary Powers, and the War of 1812. As commander-in-chief of the squadron, in 1812, he successfully defended Philadelphia, Baltimore, and Washington. The author has brought to light many new facts regarding the causes of the War of 1812.

As commander-in-chief of the Mediterranean squadron, he conducted important negotiations with Morocco, Tripoli, Tunis, and Turkey, the success of which pointed the way for all Europe in dealing with the

Barbary Powers. This European service, reflected in the private records of the Commodore, gives much new and valuable statistical history relating to the old fighting vessels of England, France, Turkey, and the Barbary Powers. It also throws new and interesting side-lights upon English-French politics and commercial relations in the early nineteenth century, upon Napoleon and his court at the time of making the French-American treaty, and his plans for colonization in the West Indies.

Commodore Rodgers was closely associated with such commanders as Decatur, Hull, Lawrence, O. H. and M. C. Perry, Porter, Bainbridge, and MacDonough. It brings to light much heretofore unpublished contemporary matter relating to the inner facts of Jefferson's administration, especially the commercial restrictions imposed by him upon England and France. Madison was especially close to Rodgers, and considerable new matter both of a personal and public character is given. Private family papers, hitherto unused, afford valuable new data on the public and private lives of many famous contemporaries, as John Quincy Adams, Jackson, Van Buren, Clay, Napoleon, Jerome Bonaparte, Generals Leclerc, Moreau, and Tarleton, Colonel Tobias Lear, Toussaint L'Ouverture, Lafayette, Robert Fulton, and others.

Rodgers spent several years in the Merchant Marine and many facts are set forth illustrative of that interesting service, the history of which is so imperfectly known. Born near Baltimore, Maryland, he early identified himself with the shipping interests of that city. For a time he resided in Philadelphia, and later in New York City, being in charge of the construction of gunboats and the New York flotilla and naval station. His home life at Washington, D. C., gives a remarkably vivid picture (such as cannot elsewhere be found) of the society and social customs of the national capital during the first half of the nineteenth century.

The author, Dr. C. O. Paullin, is one of the leading authorities on American Naval History; a resident of Washington and a graduate of the Catholic University of America. He has had full access to all family and private papers, to the official records of the Navy Department at Washington, and the British admiralty at London. He presents much hitherto unpublished material from the above sources as well as from documentary manuscript material in the "John Rodgers Papers," and other private family collections of great historical value. These until now have been preserved by the Commodore's descendents unpublished. Rare files of old newspapers in Washington, Baltimore, Philadelphia, and New York City have also furnished considerable material. An extensive bibliography of sources has been included as well as a careful analytical index.

The Arthur H. Clark Company, publishers, Cleveland, Ohio.

"Deux Marines: France-Allemagne. By Fernand Oury, with a preface by Claude Farrère. 1 volume in-16, with colored cover: 3 fr. postpaid.

The work is divided into three parts, as follows: I. General considerations concerning fighting ships. Digression upon French Naval Artillery. II. The French Navy, History, French Arsenals. State of our naval

forces at the beginning of 1910. Review of the naval program of 1905-06, and of the fleet under construction.

III. The German Navy, History, German Arsenals. The German fleet at the beginning of 1910, and a review of the proposed naval program, and of the fleet under construction.

Conclusion. Comparative tables of the two fleets.

Librairie Maritime et Coloniale, Augustin Challamel, Éditeur. 17, Rue Jacob, Paris.

"O Bloqueio Moderno: Estudo sobre Estrategia Naval." Por José Cardoso, Primeiro Tenente da Armada. Coimbra, 1909.

ANNUAL REPORT OF THE SECRETARY AND TREASURER OF THE U. S. NAVAL INSTITUTE.

TO THE OFFICERS AND MEMBERS OF THE INSTITUTE:

Gentlemen:—I have the honor to submit the following report for the year ending December 31, 1909.

ITEMIZED CASH ACCOUNT.

RECEIPTS FOR THE YEAR 1909.

Items.	First Quarter.	Second Quarter.	Third Quarter.	Fourth Quarter.	Totals.
Dues	$ 1,589 43	$ 904 11	$ 257 25	$ 115 95	$ 2,866 74
Subscriptions	638 24	247 05	270 72	310 59	1,466 60
Extra publications	9,156 90	5,633 08	5,139 94	12,971 35	32,901 27
Proceedings	55 18	27 41	8 65	9 50	100 74
Advertisements	97 58	303 77	26 88	441 84	870 07
Interest on investments	306 25	441 05	333 75	411 81	1,492 86
Postage	7 01	7 54	3 50	8 24	26 29
Binding	21 20	4 70	2 40	5 10	33 40
Expressage	1 23	0 00	0 00	0 00	1 23
Credits	4 85	40	0 00	5 31	10 56
Bonds	0 00	4,958 14	4,478 89	0 00	9,437 03
Premium on money order and draft	0 00	0 00	28	08	36
Rebates on insurance	0 00	0 00	0 00	70 40	70 40
Totals	$11,877 87	$12,527 25	$10,522 26	$14,350 17	$49,277 55

EXPENDITURES DURING THE YEAR 1909.

Items.	First Quarter.	Second Quarter.	Third Quarter.	Fourth Quarter.	Totals.
Printing and binding Proceedings	$ 725 83	$ 941 74	$ 1,014 40	$ 1,221 50	$ 3,903 47
Printing and binding extra publications	1,032 33	1,330 95	2,226 86	5,183 24	9,773 38
Salaries	770 00	780 00	780 00	780 00	3,110 00
Contributors	485 00	455 00	635 00	431 00	2,006 00
Authors of text books	0 00	482 00	840 00	3,218 00	4,540 00
Postage	124 58	124 58	160 40	102 44	512 00
Stationery	14 25	0 00	120 26	16 80	151 31
Expressage	17 16	12 80	9 16	106 60	145 72
Telegrams	3 11	1 17	1 11	4 55	9 94
Purchase of books for sale	46 90	68 28	62 81	47 07	225 06
Prize Essay award	215 60	10 78	0 00	0 00	226 38
Honorable Mention awards	285 00	0 00	0 00	0 00	285 00
Advertising	33 30	0 00	25 00	0 00	58 30
Furniture	14 00	0 00	99 50	53 58	167 08
Discount on English money and draft	84	0 00	41	0 00	1 25
Drayage and freight	25	5 00	0 00	50	5 75
Purchase of bonds	0 00	4,958 14	4,478 89	0 00	9,437 03
Draft to Berger-Levraut	0 00	0 00	29 32	0 00	29 32
Rebate to The Gibson Co.	0 00	0 00	100 00	0 00	100 00
Insurance	0 00	0 00	0 00	80 00	80 00
Underwood Typewriter Co	0 00	0 00	0 00	118 15	118 15
Miscellaneous	0 00	9 73	3 00	11 50	24 23
Totals	$ 3,768 15	$ 9,180 17	$10,586 12	$11,374 93	$34,909 37

SUMMARY.

Balance unexpended January 1, 1909	$31,834.75
Total receipts for the year 1909	49,277.55
	$81,112.30
Total expenditures for the year 1909	34,909.37
Balance unexpended January 1, 1910	$46,202.93
Bills receivable for back dues	981.50
" " " binding	4.10
" " " subscriptions	163.83
" " " extra publications	1,282.85
" " " advertisements	598.39
" " " Proceedings	6.87

Value of back numbers of the Proceedings	$ 200.00
" " Institute property	300.00
" " extra publications	1,000.00
	$50,740.47
Liabilities, approximately	1,679.28
Total assets	$49,061.19

RESERVE FUND.

Baltimore & Ohio and Northern Pacific Bonds	$4,683.14

The balance, $46,202.93, unexpended January 1, 1910, is distributed as follows:

Seamens' Bank for Savings, New York City	$3,000.00
Rhode Island Hospital Trust Co	2,706.36
Society for Savings, Hartford, Conn	2,692.08
Southern Railway bonds	6,745.14
Washington Railway and Electric Co.'s bonds	1,715.00
Northern Pacific and Great Northern bonds	12,903.14
Potomac Electric Power Co.'s bonds	2,115.00
Northern Pacific Railway bonds	6,581.20
Baltimore & Ohio Railway bonds	529.36
Cash in Farmers' National Bank	7,003.41
Checks in safe, Institute office	64.19
Money orders in safe, Institute office	32.11
Cash in safe	115.94
	$46,202.93

Respectfully,

PHILIP R. ALGER, *Professor, U. S. Navy,*
Secretary and Treasurer.

The books of the Institute have been examined from January 20, 1909, to January 19, 1910, and found to be correct, and the balance sheet verified.

GEO. R. CLARK, Commander, U. S. Navy,
JOHN HOOD, Commander, U. S. Navy,
GEO. R. MARVELL, Lieut.-Commander, N. S. Navy.
Auditing Committee.

LIST OF PRIZE ESSAYS.

1879.

Naval Education. Prize Essay, 1879. By Lieut.-Com. A. D. Brown, U. S. N.

NAVAL EDUCATION. First Honorable Mention. By Lieut.-Com. C. F. Goodrich, U. S. N.

NAVAL EDUCATION. Second Honorable Mention. By Commander A. T. Mahan, U. S. N.

1880.

"The Naval Policy of the United States." Prize Essay, 1880. By Lieutenant Charles Belknap, U. S. N.

1881.

The Type of (I) Armored Vessel, (II) Cruiser best suited to the Present Needs of the United States. Prize Essay, 1881. By Lieutenant E. W. Very, U. S. N.

SECOND PRIZE ESSAY, 1881. By Lieutenant Seaton Schroeder, U. S. N.

1882.

Our Merchant Marine: The Causes of its Decline and the Means to be taken for its Revival. "Nil clarius aquis." Prize Essay, 1882. By Lieutenant J. D. J. Kelley, U. S. N.

"MAIS IL FAUT CULTIVER NOTRE JARDIN." Honorable Mention. By Master C. G. Calkins, U. S. N.

"SPERO MELIORA." Honorable Mention. By Lieut.-Com. F. F. Chadwick, U. S. N.

"CAUSA LATET: VIS EST NOTISSIMA." Honorable Mention. By Lieutenant R. Wainwright, U. S. N.

1883.

How may the Sphere of Usefulness of Naval Officers be extended in Time of Peace with Advantage to the Country and the Naval Service? "Pour encourager les Autres." Prize Essay, 1883. By Lieutenant Carlos G. Calkins, U. S. N.

"SEMPER PARATUS." First Honorable Mention. By Commander N. H. Farquhar, U. S. N.

"CUILIBET IN ARTE SUA CREDENDUM EST." Second Honorable Mention. By Captain A. P. Cooke, U. S. N.

1884.

The Reconstruction and Increase of the Navy. Prize Essay, 1884. By Ensign W. I. Chambers, U. S. N.

1885.

Inducements for Retaining Trained Seamen in the Navy, and Best System of Rewards for Long and Faithful Service. Prize Essay, 1885. By Commander N. H. Farquhar, U. S. N.

1886.

What Changes in Organization and Drill are Necessary to Sail and Fight Effectively Our Warships of Latest Type? "Scire quod nescias." Prize Essay, 1886. By Lieutenant Carlos G. Calkins, U. S. N.

THE RESULT OF ALL NAVAL ADMINISTRATION AND EFFORTS FINDS ITS EXPRESSION IN GOOD ORGANIZATION AND THOROUGH DRILL ON BOARD OF SUITABLE SHIPS. Honorable Mention. By Ensign W. L. Rodgers, U. S. N.

1887.

The Naval Brigade: its Organization, Equipment and Tactics. "In hoc signo vinces." Prize Essay, 1887. By Lieutenant C. T. Hutchins.

1888.

Torpedoes. Prize Essay, 1888. By Lieut.-Com. W. W. Reisinger, U. S. N.

1891.

The Enlistment, Training and Organization of Crews for our Ships of War. Prize Essay, 1891. By Ensign A. P. Niblack, U. S. N.

DISPOSITION AND EMPLOYMENT OF THE FLEET: SHIP AND SQUADRON DRILL. Honorable Mention, 1891. By Lieutenant R. C. Smith, U. S. N.

1892.

Torpedo-boats: their Organization and Conduct. Prize Essay, 1892. By Wm. Laird Clowes.

1894.

The U.S.S. Vesuvius, with Special Reference to her Pneumatic Battery. Prize Essay, 1894. By Lieut.-Com. Seaton Schroeder, U. S. N.

NAVAL REFORM. Honorable Mention, 1894. By Passed Assistant Engineer F. M. Bennett, U. S. N.

1895.

Tactical Problems in Naval Warfare. Prize Essay, 1895. By Lieut.-Com. Richard Wainwright, U. S. N.

A SUMMARY OF THE SITUATION AND OUTLOOK IN EUROPE. An Introduction to the Study of Coming War. Honorable Mention, 1895. By Richmond Pearson Hobson, Assistant Naval Constructor, U. S. N.

SUGGESTIONS FOR INCREASING THE EFFICIENCY OF OUR NEW SHIPS. Honorable Mention, 1895. By Naval Constructor Wm. J. Baxter, U. S. N.

THE BATTLE OF THE YALU. Honorable Mention, 1895. By Ensign Frank Marble, U. S. N.

1896.

The Tactics of Ships in the Line of Battle. Prize Essay, 1896. By Lieutenant A. P. Niblack, U. S. N.

THE ORGANIZATION, TRAINING AND DISCIPLINE OF THE NAVY PERSONNEL AS VIEWED FROM THE SHIP. Honorable Mention, 1896. By Lieutenant Wm. F. Fullam, U. S. N.

NAVAL APPRENTICES, INDUCEMENTS, ENLISTING AND TRAINING. The Seaman Branch of the Navy. Honorable Mention, 1896. By Ensign Ryland D. Tisdale, U. S. N.

THE COMPOSITION OF THE FLEET. Honorable Mention, 1896. By Lieutenant John M. Ellicott, U. S. N.

1897.

Torpedo-boat Policy. Prize Essay, 1897. By Lieutenant R. C. Smith, U. S. N.

A PROPOSED UNIFORM COURSE OF INSTRUCTION FOR THE NAVAL MILITIA. Honorable Mention, 1897. By H. G. Dohrman, Associate Member, U. S. N. I.

TORPEDOES IN EXERCISE AND BATTLE. Honorable Mention, 1897. By Lieutenant J. M. Ellicott, U. S. N.

1898.

Esprit de Corps: A Tract for the Times. Prize Essay, 1898. By Captain Caspar Frederick Goodrich, U. S. N.

OUR NAVAL POWER. Honorable Mention, 1898. By Lieut.-Com. Richard Wainwright, U. S. N.

TARGET PRACTICE AND THE TRAINING OF GUN CAPTAINS. Honorable Mention, 1898. By Ensign R. H. Jackson, U. S. N.

1900.

Torpedo Craft: Types and Employment. Prize Essay, 1900. By Lieutenant R. H. Jackson, U. S. N.

THE AUTOMOBILE TORPEDO AND ITS USES. Honorable Mention, 1900. By Lieutenant L. H. Chandler, U. S. N.

1901.

Naval Administration and Organization. Prize Essay, 1901. By Lieutenant John Hood, U. S. N.

1903.

Gunnery in Our Navy. The Causes of its Inferiority and Their Remedies. Prize Essay, 1903. By Professor Philip R. Alger, U. S. N.

A NAVAL TRAINING POLICY AND SYSTEM. Honorable Mention, 1903. By Lieutenant James H. Reid, U. S. N.

SYSTEMATIC TRAINING OF THE ENLISTED PERSONNEL OF THE NAVY. Honorable Mention, 1903. By Lieutenant C. L. Hussey, U. S. N.

OUR TORPEDO-BOAT FLOTILLA. The Training Needed to Insure its Efficiency. Honorable Mention, 1903. By Lieutenant E. L. Beach, U. S. N.

1904.

The Fleet and its Personnel. Prize Essay, 1904. By Lieutenant S. P. Fullinwider, U. S. N.

A PLEA FOR A HIGHER PHYSICAL, MORAL, AND INTELLECTUAL STANDARD OF THE PERSONNEL FOR THE NAVY. Honorable Mention, 1904. By Medical Inspector Howard E. Ames, U. S. N.

1905.

American Naval Policy. Prize Essay, 1905. By Commander Bradley A. Fiske, U. S. N.

THE DEPARTMENT OF THE NAVY. Honorable Mention, 1905. By Rear-Admiral Stephen B. Luce, U. S. N.

1906.

Promotion by Selection. Prize Essay, 1906. By Commander Hawley O. Rittenhouse, U. S. N.

THE ELEMENTS OF FLEET TACTICS. First Honorable Mention, 1906. By Lieut.-Com. A. P. Niblack, U. S. N.

GLEANINGS FROM THE SEA OF JAPAN. Second Honorable Mention, 1906. By Captain Seaton Schroeder, U. S. N.

THE PURCHASE SYSTEM OF THE NAVY. Third Honorable Mention, 1906. By Pay Inspector J. A. Mudd, U. S. N.

1907.

Storekeeping at the Navy Yards. Prize Essay, 1907. By Pay Inspector John A. Mudd, U. S. N.

BATTLE REHEARSALS. A few thoughts on our next step in Fleet-Gunnery. First Honorable Mention, 1907. By Lieut.-Comdr. Yates Stirling, U. S. N.

THE NAVAL PROFESSION. Second Honorable Mention, 1907. By Commander Bradley A. Fiske, U. S. N.

1908.

A Few Hints to the Study of Naval Tactics. Prize Essay, 1908. By Lieutenant W. S. Pye, U. S. N.

THE MONEY FOR THE NAVY. First Honorable Mention, 1908. By Pay Inspector John A. Mudd, U. S. N.

THE NATION'S DEFENSE—THE OFFENSIVE FLEET. How Shall We Prepare It for Battle. Second Honorable Mention, 1908. By Lieut.-Commander Yates Stirling, U. S. N.

1909.

Some Ideas about Organization on Board Ship. Prize Essay, 1909. By Lieutenant Ernest J. King, U. S. N.

THE NAVY AND COAST DEFENCE. Honorable Mention, 1909. By Commodore W. H. Beehler, U. S. N.

THE REORGANIZATION OF THE NAVAL ESTABLISHMENT. Honorable Mention, 1909. By Pay Inspector J. A. Mudd, U. S. N.

A PLEA FOR PHYSICAL TRAINING IN THE NAVY. Honorable Mention, 1909. By Commander A. P. Niblack, U. S. N.

1910.

The Merchant Marine and the Navy. Prize Essay, 1910. By Naval Constructor T. G. Roberts, U. S. N.

THE NAVAL STRATEGY OF THE RUSSO-JAPANESE WAR. Honorable Mention, 1910. By Lieutenant Lyman A. Cotten, U. S. N.

NOTICE.

The U. S. Naval Institute was established in 1873, having for its object the advancement of professional and scientific knowledge in the Navy. It now enters upon its thirty-seventh year of existence, trusting as heretofore for its support to the officers and friends of the Navy. The members of the Board of Control cordially invite the co-operation and aid of their brother officers and others interested in the Navy, in furtherance of the aims of the Institute, by the contribution of papers and communications upon subjects of interest to the naval profession, as well as by personal support and influence.

On the subject of membership the Constitution reads as follows:

ARTICLE VII.

Sec. 1. The Institute shall consist of regular, life, honorary, and associate members.

Sec. 2. Officers of the Navy, Marine Corps, and all civil officers attached to the Naval Service, shall be entitled to become regular or life members, without ballot, on payment of dues or fee to the Secretary and Treasurer. Members who resign from the Navy subsequent to joining the Institute will be regarded as belonging to the class described in this Section.

Sec. 3. The Prize Essayist of each year shall be a life member without payment of fee.

Sec. 4. Honorary members shall be selected from distinguished Naval and Military Officers, and from eminent men of learning in civil life. The Secretary of the Navy shall be, *ex officio*, an honorary member. Their number shall not exceed thirty (30). Nominations for honorary members must be favorably reported by the Board of Control, and a vote equal to one-half the number of regular and life-members, given by proxy or presence, shall be cast, a majority electing.

Sec. 5. Associate members shall be elected from Officers of the Army, Revenue Cutter Service, foreign officers of the Naval and Military professions, and from persons in civil life who may be interested in the purposes of the Institute.

Sec. 6. Those entitled to become associate members may be elected life members, provided that the number not officially connected with the Navy and Marine Corps shall not at any time exceed one hundred (100).

Sec. 7. Associate members and life members, other than those entitled to regular membership, shall be elected as follows: "Nominations shall be made in writing to the Secretary and Treasurer, with the name of the member making them, and such nominations shall be submitted to the Board of Control, and, if their report be favorable, the Secretary and Treasurer shall make known the result at the next meeting of the Institute, and a vote shall then be taken, a majority of votes cast by members present electing."

The Proceedings are published quarterly, and may be obtained by non-members upon application to the Secretary and Treasurer at Annapolis, Md. Inventors of articles connected with the naval profession will be afforded an opportunity of exhibiting and explaining their inventions. A description of such inventions as may be deemed by the Board of Control of use to the service will be published in the Proceedings.

Single copies of the Proceedings, $1.00. Back numbers and complete sets can be obtained by applying to the Secretary and Treasurer, Annapolis, Md.

Annual subscriptions for non-members, $3.50. Annual dues for members and associate members, $3.00. Life members fee, $30.00.

All letters should be addressed U. S. Naval Institute, Annapolis, Md., and all checks, drafts, and money orders should be made payable to the same.

SPECIAL NOTICE.

NAVAL INSTITUTE PRIZE ESSAY, 1911.

A prize of two hundred dollars, with a gold medal, and a life-membership in the Institute, is offered by the Naval Institute for the best essay presented on any subject pertaining to the naval profession, subject to the following rules:

1. The award for the prize shall be made by the Board of Control, voting by ballot and without knowledge of the names of the competitors.

2. Each competitor to send his essay in a sealed envelope to the Secretary and Treasurer on or before January 1, 1911. The name of the writer shall not be given in this envelope, but instead thereof a motto. Accompanying the essay a separate sealed envelope will be sent to the Secretary and Treasurer, with the motto on the outside and writer's name and motto inside. This envelope is not to be opened until after the decision of the Board.

3. The successful essay to be published in the Proceedings of the Institute; and the essays of other competitors, receiving honorable mention, to be published also, at the discretion of the Board of Control; and no change shall be made in the text of any competitive essay, published in the Proceedings of the Institute, after it leaves the hands of the Board.

4. If, in the opinion of the Board of Control, the best essay presented is not of sufficient merit to be awarded the prize, it may receive "Honorable Mention" or such other distinction as the Board may decide.

5. In case one or more essays receive "Honorable Mention," the writer of the first of them in order of merit will receive seventy-five dollars and a life-membership in the Institute.

6. Any essay not having received honorable mention, may be published also, at the discretion of the Board of Control, but only with the consent of the author.

7. The essay is limited to fifty (50) printed pages of the Proceedings of the Institute.

8. All essays submitted must be either typewritten or copied in a clear and legible hand.

9. In the event of the prize being awarded to the winner of a previous year, a gold clasp, suitably engraved, will be given in lieu of the gold medal

By direction of the Board of Control.

PHILIP R. ALGER,
Professor, U. S. N., Secretary and Treasurer